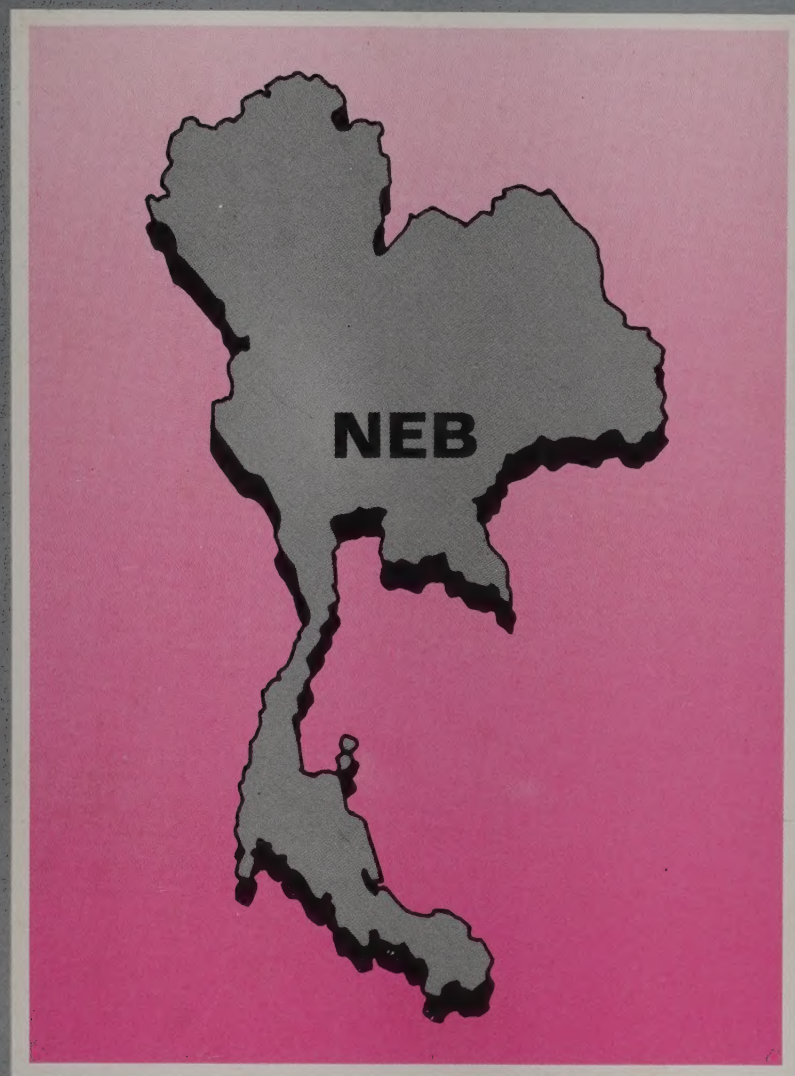


Rohde

REVIEW OF THE HEALTH SITUATION IN THAILAND PRIORITY RANKING OF DISEASES



**BY
THE FACT FINDING COMMISSION
NATIONAL EPIDEMIOLOGY BOARD OF THAILAND**

A Report Submitted to the National Epidemiology Board Members

(c) Copyright by the National Epidemiology Board of Thailand 1987 All rights reserved

ACKNOWLEDGEMENTS

We would like to acknowledge all organizations, associations, institutions, departments and divisions, Ministry of Interior and Ministry of Public Health which kindly provided us with all the documents for the study.

We are deeply grateful to the personnel at the Division of Epidemiology, Ministry of Public Health, especially the Director, Dr. Prayura Kunasol and Dr. Chanpen Choprapawon for providing all the supportive we needed.

We wish to give special credit to Ms. Suttikarn Yuttanon for her dedicate and untiring assistance in various aspects of putting this manuscript together.

Finally, we give special thanks to Mr. Tony Bennett for editing a previous draft of this document.

PH-120

11202 N87

TABLE OF CONTENTS

CHAPTER 1

	PAGE
INTRODUCTION	1
1. BACKGROUND	1
2. PURPOSE	1
3. METHODOLOGY	1
3.1. Source of Information	1
3.2. Data Collection and Data Analysis	1
4. CONSIDERATION FOR DATA INTERPRETATION	2

CHAPTER 2

EPIDEMIOLOGY PROFILE OF HEALTH IN THAILAND	3
1. GEOPGRAPHY	3
2. POPULATION	3
3. SOCIAL AND ECONOMIC DEVELOPMENT	6
3.1. Literacy and Educational Attainment	6
3.2. Occupation	7
3.3. Economy	7
4. MORBIDITY	9
4.1. Source of Information	9
4.2. Leading Causes of Illness	9
5. MORTALITY	13
5.1. Vital Statistics	14
5.2. Leading Causes of Death	16
5.3. Age Differentials of Leading Causes of Death	16
5.4. Sex Differentials of Leading Causes of Death	20
5.5. Regional Differentials of Leading Causes of Death	20
6. HEALTH UTILIZATION	23
6.1. Organization of the Ministry of Public Health	23
6.2. Infrastructure	23
6.3. Health Resources	24
6.4. Budget Allocation	27
6.5. Overview Patterns of Utilization of Health Service	28
6.6. Utilization of Maternity Service	30
6.7. Utilization of Immunization Service	32

CHAPTER 3

STATISTICS ON SIGNIFICANT CAUSES OF MORBIDITY AND MORTALITY	33
1. INTRODUCTION	33
2. INJURIES	33
2.1. Homicide	34
2.2. Suicide	40
2.3. Traffic Accidents	43
2.4. Occupational Accidents	46
3. MENTAL ILLNESS	50
3.1. Outpatients	50
3.2. Inpatients	54
3.3. State of Mental Health Research	58
3.4. Epidemiology of Mental Illness	58
4. DRUG ADDICTION	59
4.1. Source of Information	59
4.2. Morbidity and Mortality	59
4.3. Distribution by Age, Sex and Region	59
4.4. Economic Loss	59
4.5. Reasons for the First Time Drug Use	59

	PAGE
5. CANCER _____	61
5.1. Morbidity and Mortality _____	62
5.2. Epidemiology _____	73
5.3. Cancer Risk-factor Studies _____	75
6. DIABETES MELLITUS _____	76
7. DISEASES OF THE DIGESTIVE SYSTEM _____	77
7.1. Morbidity and Mortality _____	77
7.2. Distribution by Sex, Region and Age _____	79
8. HYPERTENSION _____	80
9. CORONARY HEART DISEASE _____	80
10. CEREBROVASCULAR DISEASES _____	80
10.1. Source of Information _____	81
10.2. Morbidity and Mortality _____	81
10.3. Prevalence of Stroke and Related Risks _____	81
10.4. Distribution of Deaths by Age and Sex _____	81
10.5. Case Fatality Ratio _____	83
11. COMMUNICABLE DISEASES _____	83
11.1. General Morbidity and Mortality of Communicable Diseases _____	85
11.2. Morbidity by Age Group _____	87
11.3. Morbidity by Region _____	87
11.4. Morbidity in Special Groups of Communicable Diseases _____	88
11.5. Communicable Diseases That Need Special Attention _____	88
11.5.1. Acute respiratory tract infection (ARI) _____	89
11.5.2. Acute diarrhea _____	89
11.5.3. Hepatitis B _____	93
11.5.4. Intestinal helminthiasis _____	94
11.5.5. Visceral leishmaniasis _____	95
11.5.6. Acquired immunodeficiency syndrome (AIDS) _____	95
 CHAPTER 4	
PRIORITY SETTING _____	97
1. PRIORITY SETTING _____	97
2. RESULT _____	98
 CHAPTER 5	
CONCLUSION AND RECOMMENDATION _____	101
1. CONTROL OF MAJOR HEALTH PROBLEMS _____	101
2. IDENTIFICATION AND INTERVENTION OF HEALTH RISK BEHAVIOR _____	102
3. IMPROVEMENT OF THE HEALTH INFORMATION SYSTEM _____	102
4. MULTIDISCIPLINARY COLLABORATION _____	102
 APPENDIX A1	
YEARS OF POTENTIAL LIFE LOST _____	103
 APPENDIX A2	
PRIORITY SETTING _____	105
 BIBLIOGRAPHY _____	107

LIST OF TABLES

	PAGE
Table 2.1 Population and its characteristics, Thailand, 1947-1984	4
Table 2.2 Percentage distribution of population by age and sex from the census 1960, 1970 and 1980	4
Table 2.3 Illiteracy rate of population aged 10 years and over, Thailand, 1960, 1970 and 1980	6
Table 2.4 Illiteracy rate by age, Thailand, 1960, 1970, 1980	6
Table 2.5 Percent of population who completed different level of education by age and sex, Thailand, 1960, 1970, 1980	7
Table 2.6 Rate of employment in agricultural sector, Thailand, 1975-1982	8
Table 2.7. Percentage of economically active population involved in agriculture compared with all other occupations by sex, Thailand, 1960, 1970, 1980	8
Table 2.8. Gross Domestic Product (GDP) at constant price and current price (million baht), GDP per capita and growth rate, Thailand, 1970-1984	8
Table 2.9 Morbidity rate (per 1,000 population) and percentages of 17 cause groups according to report no. 504 (outpatient report) by region, Thailand, 1982	10
Table 2.10. Morbidity rate (per 1,000 population) and percentages of 17 causes of diseases according to report no. 504 (outpatient report), Thailand, 1982-1985	11
Table 2.11. Percent and rate (per 100,000 population) of inpatients by cause of diseases according to report no. 505, 1983-1984	12
Table 2.12. Diagnosis of illness(per 1,000 population)per month by place of residence,1985	13
Table 2.13. Number and rate (per 1,000 population) of livebirths and deaths, natural increase and vital index, Thailand, 1951-1983	14
Table 2.14. Expectation of life at birth and 5 years of age by sex, projected for 1970-2000	15
Table 2.15. Number and rate (per 1,000 livebirths) of stillbirths, perinatal deaths, infant deaths, and maternal deaths, 1951-1983	15
Table 2.16. First 20 leading cause groups of death by rate (per 100,000 population) according to ICD Basic Tabulation List, 9th revision, 1979-1983	17
Table 2.17. Leading causes of death (rate per 100,000 population) among infants and early childhood, Thailand, 1979-1982	18
Table 2.18. Leading causes of death (rate per 100,000 population) by age group, Thailand, 1979-1982	19
Table 2.19. Selected leading causes of death (rate per 100,000 population) by sex, 1979-1983	21
Table 2.20. Death rate per 100,000 population (all ages) on causes of death by sex, Thailand, 1985-1986	22
Table 2.21. Death rate per 100,000 population (all ages) on causes of death by region, Thailand, 1983-1986	23

	PAGE
Table 2.22. Number of medical and health personnel of each category by type of administration, Thailand, 1984	24
Table 2.23. The ratio between population to medical and health personnel in Bangkok Metropolis and other provinces, 1984	26
Table 2.24. Number of beds, ratio between population and beds for general services, Bangkok Metropolis and other provinces, 1984	26
Table 2.25. Budget allocation for public health, 1971-1985	27
Table 2.26. Total health expenditure from government budget as a percentage of GDP, per capita of total population and per capita of Bangkok population, 1976-1984	28
Table 2.27. Utilization of health resources: comparison between the two surveys conducted by the Ministry of Public Health, 1970 and 1979	29
Table 2.28. Pattern of utilization of health resources for those who reported ill, classified by residence, 1979	29
Table 2.29. Pattern of utilization of health resources for those who reported ill, classified by sex, 1979	30
Table 2.30. Rate of mothers delivered by professional or trained personnel per 100,000 livebirths, 1975-1982	31
Table 2.31. Utilization of delivery services during the past year, urban and rural areas, 1979 and 1980	31
Table 2.32. Travelling time and cost of maternity service by urban-rural residence, 1979 and 1981	32
Table 2.33. Coverage of vaccination program, Thailand, 1985 and 1986	32
Table 3.1. Number, rate (per 100,000 population) and percentage (of total deaths) of homicide and injury purposely inflicted by other persons by sex, Thailand, 1957-1984	35
Table 3.2. Number and percent of homicide by age group and sex of victims, Thailand, 1977 and 1984	36
Table 3.3. Number and rate (per 100,000 population) of deaths from homicide and injury purposely inflicted by other persons by sex and regions, Thailand, 1980-1984	37
Table 3.4. Number and percent of homicide by weapon and sex of victims, Thailand, 1977 and 1984	39
Table 3.5. Years of potential life lost of homicide by age group and sex, Thailand, 1977-1984	39
Table 3.6. Number and rate (per 100,000 population) of suicide, Thailand, 1977-1984	40

	PAGE
Table 3.7. Number and percent of suicide by age group and sex, Thailand, 1977 and 1984	41
Table 3.8. Suicide rate (per 100,000 population) by age group and sex, Thailand, 1977 and 1984	41
Table 3.9. Inpatients and deaths from motor vehicle accidents, Thailand, 1981-1984	43
Table 3.10. Morbidity and mortality rate (per 100,000 population) from occupational accidents, Thailand, 1980-1984	47
Table 3.11. Occupational accidents by industry, Thailand, 1983-1985 average	50
Table 3.12. Number of outpatients with non-communicable diseases among the 13 cause groups according to report no. 504 and rates (per 1,000 population), Thailand, 1983-1984	51
Table 3.13. Number and percent of outpatients by groups of diseases and region, fiscal year 1985, 1986 (October 1984-October 1986)	53
Table 3.14. Number and percent of inpatients of psychiatric disorder classification by ICD-9 by sex, Thailand, 1986	55
Table 3.15. Number and percent of psychiatric inpatient by age group and sex, Thailand, 1986	57
Table 3.16. Number and percent of inpatients of selected psychiatric illness by age group, fiscal year 1984	57
Table 3.17. Incidence rate (per 100,000 population) for cancer of all sites by sex, Thailand, 1971-1981	62
Table 3.18. Cancer mortality rate (per 100,000 population) by sex, Thailand, 1971-1983	62
Table 3.19. Cancer incidence rate (per 100,000 population) by age group and sex, Thailand, 1981	63
Table 3.20. Cancer death rate (per 100,000 population) by age group, Thailand, 1979-1983	64
Table 3.21. Male death from cancer, number and rate (per 100,000 population) by age group, Thailand, 1979-1983	64
Table 3.22. Female cancer death, number and rate (per 100,000 population) by age group, Thailand, 1979-1983	65
Table 3.23. Cancer patients by sex and occupation, Thailand, 1981	65
Table 3.24. Incidence rate (per 100,000 population) of the ten leading sites of cancer in male, Thailand, 1981	66
Table 3.25. Incidence rate (per 100,000 population) of the ten leading sites of cancer in female, Thailand, 1981	66

	PAGE
Table 3.26. Age-specific incidence rate (per 100,000 population) of special cancer sites in male Thailand, 1981	67
Table 3.27. Age-specific incidence rate (per 100,000 population) of special cancer sites in female, Thailand, 1981	67
Table 3.28. Epidemiological studies of cervical cancer in Thailand	74
Table 3.29. Epidemiological studies of liver cancer in Thailand	75
Table 3.30. Morbidity and mortality rate of diabetes mellitus among the Thai population	76
Table 3.31. Number of deaths and death rate (per 100,000 population) from diseases of the digestive system other than diseases of the oral cavity, salivary glands and jaws by sex (ICD = 531-534, 540-543, 550-553, 560, 571, 573) Thailand, 1979-1983	77
Table 3.32. Number of deaths and death rate (per 100,000 population) from chronic liver diseases and cirrhosis by sex (ICD = 571), Thailand, 1979-1983	78
Table 3.33. Number, rate (per 100,000 population) and percent of outpatients of digestive system diseases by region, Thailand, 1981-1983	78
Table 3.34. Deaths and death rate (per 100,000 population) from chronic liver diseases and cirrhosis by sex and region, Thailand, 1979-1983	78
Table 3.35. Morbidity and mortality rate of hypertension and coronary heart diseases among the Thai population	80
Table 3.36. Inpatients and deaths from cerebrovascular diseases, Thailand, 1981-1984	81
Table 3.37. Ranking of leading communicable diseases by morbidity rate, mortality rate, case fatality ratio and years of potential life lost (YPLL), Thailand, 1984 (population 50,396,000)	84
Table 3.38. Ranking of selected communicable diseases by average hospital stay (days), Thailand, 1983	85
Table 3.39. Ranking of leading communicable diseases by morbidity rate (per 100,000 population) in various age group, Thailand, 1984	86
Table 3.40. Ranking of leading communicable diseases by morbidity rate (per 100,000 population) by region, Thailand, 1984	87
Table 3.41. Ranking by morbidity rate (per 100,000 population) of vaccine preventable diseases, food and water borne diseases, vector borne diseases, and other communicable diseases, Thailand, 1984 (population 50396000)	88
Table 3.42. Reported cases of hepatitis by type, Thailand, 1980-1984	90

	PAGE
Table 3.43. Age-specific prevalence (percent) of HBV infection in three Thai populations	90
Table 3.44. Prevalence of HBsAg in the general Thai population	91
Table 3.45. Prevalence of HBsAg in some high risk Thai populations	91
Table 3.46. Incidence of HBV infection in three Thai populations	92
Table 3.47. Prevalence of HBsAg in hepatitis patients	92
Table 3.48. Prevalence of HBsAg in pregnant Thai women	93
Table 3.49. Prevalence (percent) of intestinal parasite infestations in different regions, Thailand, 1980-1981	93
Table 3.50. Age-specific prevalence (percent) of intestinal helminthiasis, Thailand, 1980-1981	94
Table 3.51. Seroepidemiological surveys for HIV antibodies, conducted in Thailand, 1985-1986	96
Table 4.1. Ranking of diseases according to the total score value	99
Table 4.2. Ranking of diseases according to their preventability and treatability	100

LIST OF FIGURES

	PAGE
Figure 2.1 Trend in number of population from 8 censuses, Thailand	3
Figure 2.2 Age and sex structure of population, 1970 and 1980	5
Figure 2.3 Organization of the Ministry of Public Health, 1985	25
Figure 2.4 The infrastructure of provincial health services in Thailand, 1985	25
Figure 3.1 Rate (per 100,000 population) of major causes of injury death, Thailand, 1985	34
Figure 3.2 Homicide rate (per 100,000 population) by age and sex of victim, Thailand, 1984	37
Figure 3.3 5 year average number of homicide death by month, Thailand, 1977-1984	38
Figure 3.4 Suicide rate (per 100,000 population) by region, Thailand, 1977-1984	42
Figure 3.5 Methods of suicide by sex, Thailand, 1984	42
Figure 3.6 Mortality rate (per 100,000 population) from traffic accidents, Thailand, 1957-1984	44
Figure 3.7 Death proportion of traffic accidents by sex, Thailand, 1980-1984	44
Figure 3.8 Death rate (per 100,000 population) from traffic accidents by regions, Thailand, 1983	45
Figure 3.9 Death proportion of traffic accidents by month, Thailand, 1984	45
Figure 3.10 Death proportion of traffic accidents by age group, Thailand, 1984	46
Figure 3.11 Morbidity and mortality rate (per 100,000 population) from occupational accidents, 1980-1984	48
Figure 3.12 Occupational accidents by sites of body, Thailand, 1983-1984	48
Figure 3.13 Number of occupational injuries by age group, Thailand, 1984	49
Figure 3.14 Occupational accidents by factory size, Thailand, 1983-1985	49
Figure 3.15 Outpatients of psychiatric illness by region, Thailand, 1981	51
Figure 3.16 Rate (per 100,000 population) of mental illness by provinces, Thailand, 1983	52
Figure 3.17 Number of outpatients and inpatients, Thailand, fiscal year 1977-1984	53
Figure 3.18 Inpatients of mental health and drug dependence by region, Thailand, 1981	54
Figure 3.19 Rate (per 1,000 admission) of mental disorder by occupation, Thailand, 1981	55
Figure 3.20 Percentage of inpatients in psychiatric hospitals by type of illness, Thailand, 1982-1986	56
Figure 3.21 Rate of drug addiction, Thailand, 1980-1985	60
Figure 3.22 Proportion of drug addiction by age group, Thailand, 1985	60
Figure 3.23 Cases of heroin addiction by residence, Thailand, 1985	61

	PAGE
Figure 3.24 Percent distribution by age of the cancer patients and Thai population, 1980	63
Figure 3.25 Cancer incidence rate by region, Thailand, 1981	68
Figure 3.26 Rate of breast cancer by region, Thailand, 1981	68
Figure 3.27 Rate of colorectum cancer by region, Thailand, 1981	69
Figure 3.28 Rate of stomach cancer by region, Thailand, 1981	69
Figure 3.29 Rate of oesophageal cancer by region, Thailand, 1981	70
Figure 3.30 Rate of liver cancer by region, Thailand, 1981	70
Figure 3.31 Rate of oral cavity cancer by region, Thailand, 1981	71
Figure 3.32 Rate of cervix uteri cancer by region, Thailand, 1981	71
Figure 3.33 Rate of lung cancer by region, Thailand, 1981	72
Figure 3.34 Rate of nasopharynx cancer by region, Thailand, 1981	72
Figure 3.35 Cumulative percentage of cirrhosis by age and sex, Thailand, 1983	79
Figure 3.36 Mortality rate (per 100,000 population) from cerebrovascular cause, Thailand, 1957-1984	82
Figure 3.37 Deaths from intracranial hemorrhage by age-group, 1984	82
Figure 3.38 Deaths from cerebrovascular causes by sex, Thailand, 1980-1984	83

CHAPTER 1

INTRODUCTION

1. BACKGROUND

On June 3, 1986, the National Epidemiology Board of Thailand (NEB) was established to serve as a national resource of the continuing medical intelligence for the Ministry of Public Health. The main function of the Board is to provide the Ministry upon request of the national health situation and to suggest areas of interest for current research.

In order to know the current national health status, the NEB has appointed a commission called the Fact Finding Commission to research into several areas of scientific literature to arrive at a summary of the nation's health profile and to rank the problems (based upon some suitable criteria) to best identify the situation.

Consequently, this document was prepared by the Fact Finding Commission of the National Epidemiology Board of Thailand summarizing the existing epidemiological data on the leading causes of morbidity and mortality of the nation. An attempt was made to prioritize these causes according to a priori criteria aiming to depict a picture of the nation's health problems based upon documented data. Most of the known causes of morbidity and mortality were graded upon a score whose value was the sum of individual scores, given to several epidemiological variables, such as morbidity rate, mortality rate, years of potential life lost, and others. A high score would indicate a more significant problem.

This finding combined with the study of the health administrators' opinion will, hopefully, provide all levels of health professionals with appropriate information for effective planning and further action.

2. PURPOSE

The general purpose of this undertaking was to collect documented data on the nation's health problems and to identify areas of interest for further research so that the results will be useful for the Ministry of Public Health to improve the nation's health status.

To be specific, the purposes are :

1. to identify the extent of significant diseases in Thailand using previously documented data ;
2. to set priorities of current health problems according to certain parameters ;
3. to suggest areas of research on the leading problems.

3. METHODOLOGY

3.1 Source of Information

Data on the diseases were gathered from all available documented sources which can be listed as follows :

3.1.1 For the majority of the diseases, the Public Health Statistics published annually by the Division of Health Statistics, and the Statistical Report published annually by the Department of Medical Services provide recent and adequate data on morbidity, mortality and population statistics.

3.1.2 Data from surveys at the national, regional or provincial levels were provided as the secondary data source for comparison with the data from other sources and as the primary data source for those diseases which had no routine hospital collection, such as hypertension. An important survey cited in this study was the Morbidity and Mortality Differential ASEAN Population Program Survey Phase III (Prasartkul 1985).

3.1.3 Data from professional organizations, associations, institutions, police records or interested groups provided the numerators of several disease statistics, such as vehicle accidents.

3.2 Data Collection and Data Analysis

All of the documented reports available for the past several years were gathered in a single place for research by the members and staff of the Commission. All available data on mortality, morbidity, length of hospital stay, and distributions by age group, by region, and by sex were abstracted from all sources for as many years as feasible with particular attention to the period after 1979.

Data were then compiled into tables and graphs were plotted. Raw data were converted into rates. Years of potential life lost (YPLL) were calculated from distribution of the diseases by age using life expectancy of 61 years for males and 65 years for females. The calculation procedure for YPLL can be found in Appendix A1.

4. CONSIDERATION FOR DATA INTERPRETATION

There may be limitations to the results of the study because data were gathered from various sources without any systematic control. Therefore, several issues should be considered with the interpretation of the data.

4.1 Causes of death data are tabulated according to the International Classification of Diseases (ICD) codes. There have been several changes in the definitions of the coding of certain diseases. The last major change was in 1979 when the Eight Revision List was substituted by the Ninth Revision. Some definitions of the diseases and the procedure for identifying underlying causes of death may have changed. Consequently, the magnitude of a few diseases may see abrupt changes after 1979. For example, before 1979 the mortality rates from heart failure ranged between 8 to 12 per 100,000 population, but since 1979 they have changed to 22-25 per 100,000 population. Therefore, interpretation of those findings should be made with caution.

4.2 Thailand's law requires that the head of household is responsible for death registration usually at the place of occurrence. When death occurs in the area without a knowledgeable attendant at death, the diagnosis of cause of death may not be accurate. The Division of Health Statistics has prepared a manual on the diagnosis of causes of death using symptoms leading to death for use in such cases. This has proved useful because "death from unknown causes" has gradually declined from 50% to around 30% (from 1970-1983). Still, cautions must be taken in the interpretation of narrow categories of causes of death. Grouping causes into broader categories of related conditions would minimize variations in diagnosis.

4.3 It should be noted that Thailand has implemented the Expanded Program on Immunization (EPI) since 1977. The program includes childhood immunization against diphtheria, pertussis, tetanus, tuberculosis, polio and tetanus toxoid for pregnant mothers. Thus, declines in these diseases are to be expected.

4.4 Many diseases, especially malignant neoplasms, saw a marked increase during recent years because of the advancement in medical technology to diagnose the diseases and the better coverage of the whole nation by more qualified personnel. The apparent trend may in part be an artifact from better case recognition.

4.5 The morbidity and mortality statistics employed in the rankings of Thailand's health problems were crude rates. Before comparison could be made with rates from other countries, these rates should be adjusted for age or sex. However, the trend of these crude rates can still be compared to the trends of other diseases in Thailand because the age distribution of the Thai population did not change dramatically within the past decade.

4.6 A phenomenon which has not received enough attention is the cohort effect in some diseases. This can happen when a group of people, such as all infants born in 1977, are exposed to some factor which might increase or decrease the risk of disease later in life. There may well be certain diseases showing apparent increasing or decreasing trend with age when, in fact, without taking cohort into consideration, an apparently increasing rate with age can result from earlier cohort of infants who were not protected while later cohorts were protected.

4.7 For some diseases, the statistics are not as current as others. Most are from 1983 and some are as recent as 1986. Trends should be reliable but comparison of the rates from different years should be done with caution. In order to determine the leading problems, the most recent data were compiled into a table. Since some values may not be from the same year, bias may exist. However, all parameters were scored from 1 to 5 or from low to high, to minimize discrepancies.

4.8 In several instances, no data were available on some disease parameters. An option was to leave that parameter blank but this was rejected in favor of substituting a subjective value for that parameter. Since subjective values may differ, interpretation should be made with caution. It was the belief that by scoring the parameter into an ordinal value, the scoring would be quite adequate and reliable.

CHAPTER 2

EPIDEMIOLOGY PROFILE OF HEALTH IN THAILAND

1. GEOGRAPHY

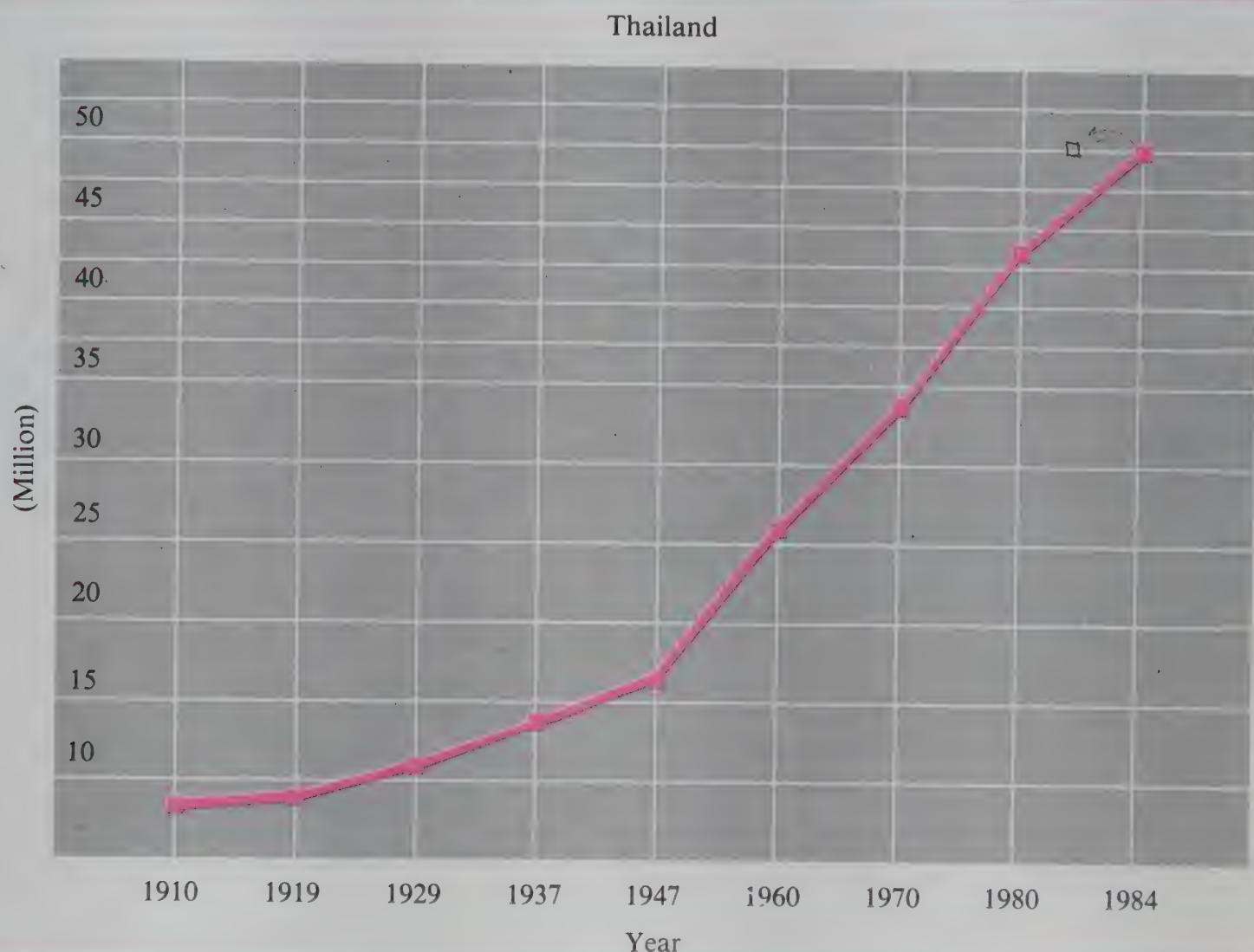
Thailand, a country of 514,000 square kilometres land area, is situated on the Indochina peninsula of Southeast Asia between 5 degrees and 21 degrees north latitude and 97 degrees and 106 degrees longitude. This is a tropical country and the majority of the population engage in agricultural occupation.

The country is divided into 4 geographical regions, the central, including the capital city of Bangkok, the northern, the northeastern, and the southern regions. The central region is relatively more prosperous and densely populated than the others, whereas the northeastern is the largest in land area but the least economically developed. Administratively, the country is divided into 73 provinces, approximately 700 districts, 5,000 subdistricts and around 55,000 villages.

2. POPULATION

The National Statistical Office estimated Thailand's population on January 1985 to be 50.7 million with a population growth rate of 1.7 percent. The trend of population growth is shown in Figure 2.1. Table 2.1 shows population characteristics of Thailand from 1947-1984, indicating that the country is growing more urbanized and is having an increase in proportions of the older ages and a decrease in the dependency ratio. Table 2.2 and Figure 2.2 depict clearly the change in the age structure of the Thai population of both sexes.

Figure 2.1 Trend in number of population from 8 censuses Thailand



Incorrect plot
misleading?!

Table 2.1 Population and its characteristics, Thailand, 1947-1984

Characteristics	1947	1960	1970	1980	1984
Total population (in thousand)	17433	26260	34397	44825	50583
Males	8722	13154	17124	22329	25449
Females	8721	13104	17274	22496	25134
Sex ratio	100.01	100.40	99.10	99.30	101.30
Dependency ratio		92	85	75	66
Percent of population under 5	-	16.2	16.4	12.1	-
Percent of population 60 and over	-	4.5	5.1	5.3	-
Percent of population 15-60	-	52.2	49.8	56.4	-
Percent of urban population	-	12.5	13.2	17.0	17.5
Population per square kilometer	34	51	70	87	98

Note : Population in 1984 is calculated from the Report of Division of Civil Registration, Ministry of Interior. All others are from population censuses.

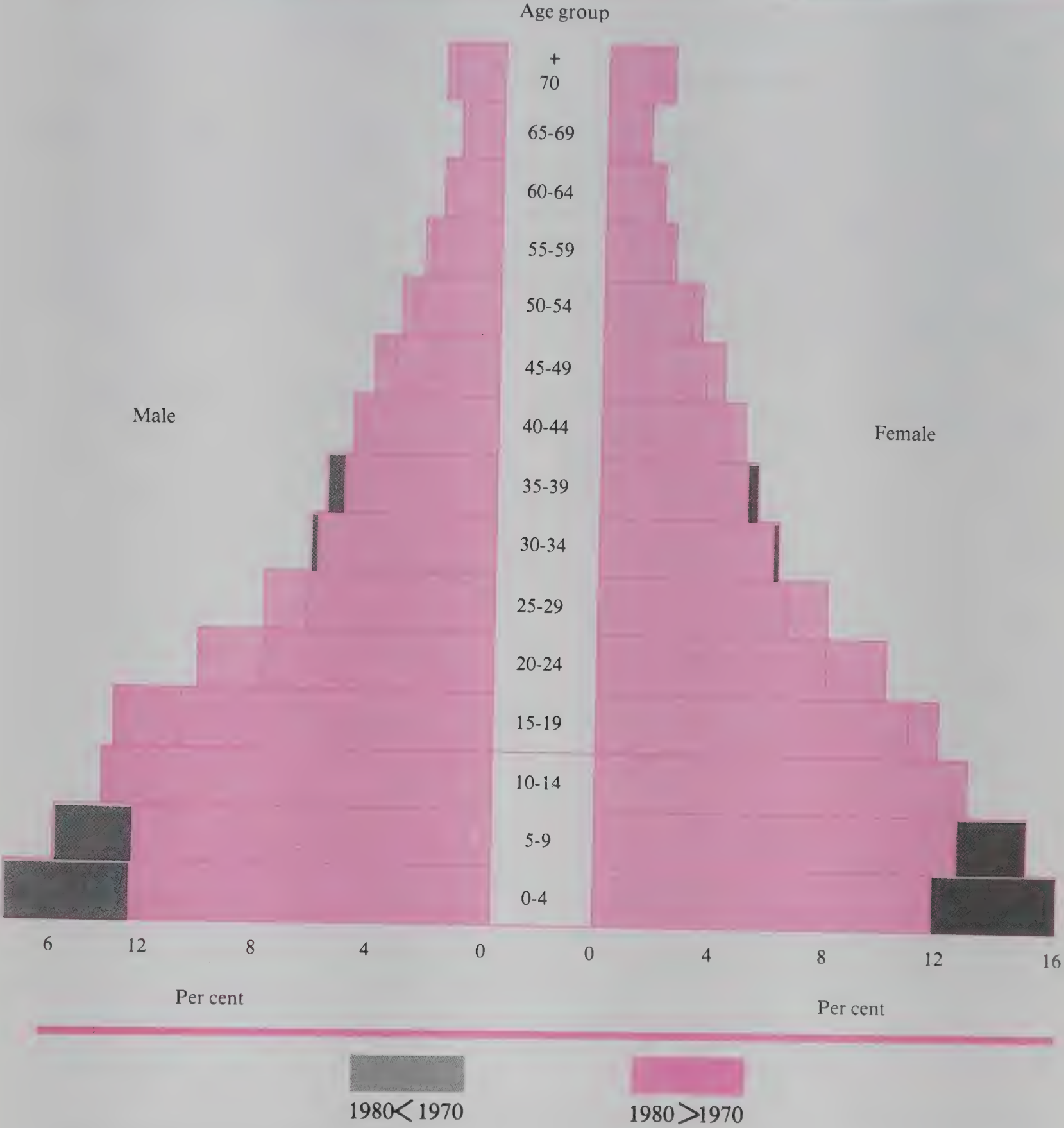
Source : ESCAP Asian Population Studies Series No. 77 p 3

Table 2.2 Percentage distribution of population by age and sex from the census 1960, 1970 and 1980

Age	1960		1970		1980	
	Male	Female	Male	Female	Male	Female
0-4	8.2	8.0	8.3	8.1	6.2	5.9
5-9	7.7	7.6	7.8	7.6	6.6	6.4
10-14	6.0	5.8	6.7	6.6	6.7	6.5
15-19	4.8	4.7	5.3	5.5	6.0	6.0
20-24	4.6	4.6	3.8	4.0	5.0	5.1
25-29	3.9	4.0	3.2	3.3	3.9	4.1
30-34	3.4	3.3	3.0	3.1	3.0	3.0
35-39	2.6	2.6	2.8	2.8	2.6	2.6
40-44	2.2	2.2	2.3	2.2	2.4	2.5
45-49	1.9	1.8	1.7	1.7	2.1	2.2
50-54	1.5	1.6	1.4	1.4	1.7	1.7
55-59	1.2	1.3	1.1	1.2	1.2	1.3
60-64	0.9	0.9	0.9	0.9	0.9	0.9
65-69	0.6	0.6	0.6	0.7	0.7	0.7
70-74	0.3	0.4	0.4	0.5	0.4	0.6
75 +	0.3	0.5	0.5	0.6	0.4	0.7
Total	50.1	49.9	49.8	50.2	49.8	50.2

Source : National Statistical Office, Office of the Prime Minister, Thailand, Population and Housing Census 1960, 1970, 1980

Figure 2.2 Age and sex structure of population , 1970 and 1980



Source : ESCAP Asian Population Studies Series No. 77 p.5

3. SOCIAL AND ECONOMIC DEVELOPMENT

Three common indicators, namely educational level, occupation and income will be discussed to illustrate the status of social and economical development of the Thai people.

3.1 Literacy and Educational Attainment

At the present time, the length of the compulsory primary education for Thai people is 6 years; previously it was 4 years. Since the rate of school attendance is increasing, the illiteracy rate as measured from population 10 years of age and over is decreasing markedly as shown in Tables 2.3, 2.4 and 2.5. The illiteracy rate was 10.5 percent in 1980 compared to 29.2 in 1960. The present cohort of population 10-50 years old also has lower illiteracy rate than previous generations and males have better education than female. The level and trend of educational attainment of the population 6 years and over show that recently, there has been a rise in rates of higher levels of education consistent with time trends especially those in the age group 13-29 years for both males and females.

Table 2.3 Illiteracy rate of population aged 10 years and over, Thailand, 1960, 1970 and 1980

Year	1960	1970	1980
Total	29.2	18.3	10.5
Male	19.4	11.1	6.9
Female	39.0	25.2	13.9

Source: National Statistical Office, Office of the Prime Minister, Thailand, Population and Housing Census 1960, 1970, 1980

Table 2.4 Illiteracy rate by age, Thailand, 1960, 1970, 1980

Age group	1960	1970	1980
10-14	14.2	5.0	3.2
15-19	11.5	5.7	2.9
20-24	16.0	7.2	3.4
25-29	19.7	10.4	4.4
30-34	21.8	14.9	5.7
35-39	34.0	17.0	8.2
40-44	46.4	21.9	12.0
45-49	52.0	34.1	14.3
50-54	62.3	46.5	20.0
55-59	67.3	51.5	32.6
60-64	70.9	62.5	44.5
65-69	72.4	66.6	52.3
70+	76.1	73.8	68.3
Total	29.2	18.2	10.5

Source: National Statistical Office, Office of the Prime Minister, Thailand, Population and Housing Census 1960, 1970, 1980

Table 2.5 Percent of population who completed different level of education by age and sex, Thailand, 1960, 1970, 1980

Age/Level of Education	1960			1970			1980		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
6-10 years									
Primary level	39.4	39.4	39.4	51.9	51.8	52.0	64.7	64.5	64.9
Other education	0.8	0.8	0.7	1.6	1.6	1.6	0.0	0.0	0.0
11-17 years									
Primary level	76.3	75.2	77.4	87.8	88.1	87.5	83.1	82.7	83.5
Secondary level	13.2	15.8	10.6	5.9	6.7	5.2	12.8	13.5	12.1
Other education	0.4	0.6	0.2	0.2	0.3	0.1	0.1	0.3	0.0
18-29 years									
Primary level	72.6	73.0	72.2	78.1	77.7	78.5	72.8	70.2	75.3
Secondary level	7.8	10.9	4.7	10.4	13.0	7.9	16.7	20.2	13.3
University level	1.0	1.2	0.8	1.3	1.4	1.2	5.3	5.3	5.3
Other education	0.9	1.5	0.3	0.2	0.4	0.0	0.2	0.4	0.0
30 and over									
Primary level	39.0	48.8	29.4	54.7	62.7	47.1	66.6	70.3	63.0
Secondary level	4.7	7.3	2.0	3.3	5.0	1.6	5.8	8.3	3.5
University level	0.5	0.7	0.2	1.0	1.5	0.6	2.2	2.8	1.6
Other education	1.4	2.3	0.4	0.3	0.5	0.0	0.4	0.7	0.0
60 and over									
Primary level	54.7	58.3	51.1	66.7	69.6	63.8	71.4	72.0	70.8
Secondary level	6.2	8.5	3.9	4.9	6.2	3.5	9.3	11.2	7.4
University level	0.5	0.6	0.3	0.7	0.9	0.5	2.2	2.4	2.0
Other education	1.0	1.5	0.4	0.5	0.7	0.3	0.2	0.4	0.0

Source: National Statistical Office, Office of the Prime Minister, Thailand, Population and Housing Census 1960, 1970, 1980

3.2 Occupation

Since the major occupation of the Thai people is agriculture, out of the total land area of 514,000 square kilometres, it was estimated that the agricultural holding area was 198,000 square kilometers in 1984. The ratio of rural population per agricultural holding land was about 200 persons per square kilometer. The ratio was held constant despite the increasing population over time. Tables 2.6 and 2.7 show the percentage of economically active population involved in agriculture. The percentage distribution is nearly the same between males and females (49.6% and 50.4% respectively) although the trend from 1975 to 1982 indicates a decline in agricultural employment.

3.3 Economy

Previously, Thailand had a very high population growth rate which was a great obstacle to economic development. Since the establishment of family planning program at a national level, the growth rate has declined to the level of 1.7 percent along with the change in Gross Domestic Product (GDP) which indicates some degree of economic development during the past 15 years from 1970 to 1984 (Table 2.8).

Table 2.6 Rate of employment in agricultural sector, Thailand, 1975-1982

Year	Rate of employment in agricultural sector	Rate of female employed in agricultural sector
1975	73.0	75.7
1976	75.8	77.8
1977	73.5	75.6
1978	73.7	76.6
1979	70.7	73.0
1980	70.8	74.1
1981	71.9	74.2
1982	68.4	70.6

Source: ESCAP Asian Population Studies Series No. 77 p. 51

Table 2.7 Percentage of economically active population involved in agriculture compared with all other occupations by sex, Thailand, 1960, 1970, 1980

	1960	1970	1980
Percent in agriculture to all other occupations by sex:			
Male	76.9	73.6	69.3
Female	85.8	82.5	75.4
Both sexes	81.2	77.8	72.2
Percent distribution of those in agriculture by sex:			
Male	48.9	49.9	49.6
Female	51.1	50.1	50.4
Total	100.0	100.0	100.0

Source: ESCAP Asian Population Studies Series No. 77 p 51

Table 2.8 Gross Domestic Product (GDP) at constant price and current price (million baht), GDP per capita and Growth rate, Thailand, 1970-1984

Year	GDP at 1972 price	GDP at current price	GDP per capita at 1972 price	Growth rate of GDP at constant price	Growth rate of GDP at current price
1970	150092	136060	4126.8	—	—
1971	157088	144607	4195.3	4.7	6.3
1972	164626	164626	4272.7	4.8	13.8
1973	180146	216543	4545.5	9.4	31.5
1974	189950	271368	4662.4	5.4	25.3
1975	203154	298816	4860.7	7.1	10.1
1976	221225	377635	5144.2	8.7	13.0
1977	237173	393030	5371.4	7.2	16.4
1978	216097	469952	5761.4	10.1	19.6
1979	276907	556240	5955.5	6.1	18.4
1980	292852	684930	6141.3	5.8	23.1
1981	311270	786166	6365.7	6.3	14.8
1982	324032	846136	6465.8	4.1	7.6
1983	342946	924254	6679.0	5.8	9.2
1984	363563	991752	6912.4	6.0	7.3

Source: ESCAP Asian Population Studies Series No. 77 p. 50

4. MORBIDITY

4.1 Source of Information

Information about morbidity statistics is based on the Annual Public Health Statistic Report compiled by the Division of Health Statistics of the outpatient and hospital admission records from all governmental hospitals. All provincial health offices are assigned to transfer illness statistics to the Central Information Center on the monthly basis. Outpatient reports by groups of diseases or symptoms (17 groups) under the official coding report 504 are made by all health institutions. Inpatient report by disease under the official coding report 505 is made by all governmental hospitals. Another important source of morbidity and mortality data is the disease notification system operated under the Division of Epidemiology, Ministry of Public Health. For disease surveillance purpose, all hospitals, health centers, and clinics are requested to report occurrence of 55 notifiable diseases/conditions, most of which are infectious diseases, using notification card-506, to provincial health offices for their information. The notification cards are further submitted to the Division of Epidemiology where country data are collected, analysed and reported.

The Morbidity and Mortality Differential Asean Population Program, Phase III (Prasartkul 1985) is also a useful source of illness statistics. The data from the Morbidity and Mortality Differential are collected from household interview surveys about the admission to any hospitals during the past one year prior to the survey date and also illnesses occurring among household members within one month prior to the survey.

The national morbidity survey was conducted according to a stratified two-stage sampling and self-weighting process during 15 April to the end of May 1985. The samples included 12 blocks in urban areas and 49 villages in rural area. A total of 7,314 households in 19 provinces was included. All households and all persons residing in each sample block/village were interviewed.

4.2 Leading Causes of Illness

The 17 groups of diseases or symptoms from outpatient reports for the whole country and by region is shown in Table 2.9. The five leading groups of illnesses (and rate) are diseases of the respiratory system (107.4/1,000), symptoms and ill-defined conditions (95.7/1,000), diseases of digestive system (61.1/1,000), infectious diseases (54.8/1,000), and accidents, poisoning and violence (36.4/1,000). The other causes of morbidity are mental disorders, diseases of nervous system, endocrine diseases, nutritional and metabolic diseases, certain causes of perinatal morbidity and mortality, infectious diseases, diseases of the genitourinary system, and congenital anomalies. The magnitude of the rates does not differ appreciably among the regions.

During the four-year period from 1982 to 1985, the first three leading causes of illness remained the same (Table 2.10). The selected causes of diseases of inpatients are shown in Table 2.11. Enteritis and other diarrhoeal diseases, malaria, and motor vehicle accidents are three major causes of diseases for inpatient.

Table 2.9 Morbidity rate (per 1,000 population) and percentages of 17 cause groups according to report no. 504 (outpatient report) by region, Thailand, 1982

Cause of diseases	Whole country		Northern		Northeastern		Central		Southern	
	Rate	Percent	Rate	Percent	Rate	Percent	Rate	Percent	Rate	Percent
Total	492.0	100.0	468.0	100.0	439.9	100.0	588.7	100.0	523.3	100.0
Infectious diseases	54.8	11.1	51.0	10.9	50.6	1.5	58.9	10.0	66.8	12.8
Neoplasma	1.9	0.4	2.1	0.5	1.5	0.3	2.0	0.3	2.5	0.5
Endocrine, nutritional and metabolic diseases	11.6	2.4	12.8	2.7	11.1	2.5	12.0	2.0	10.5	2.0
Blood and blood forming organs	5.2	1.1	4.2	0.9	6.1	1.4	4.2	0.7	6.2	1.2
Mental disorder	15.4	3.1	14.4	3.1	13.7	3.1	18.4	3.1	16.9	3.2
Nervous system and sense organs	18.9	3.8	18.9	4.0	17.3	4.0	21.8	3.7	19.0	3.6
Circulatory system	12.0	2.4	12.5	2.7	9.9	2.3	14.3	2.4	13.2	2.5
Respiratory system	107.4	21.8	98.7	21.1	90.2	20.5	136.9	23.3	112.7	23.5
Digestive system	61.1	12.4	54.0	11.5	63.1	14.3	70.1	11.9	52.8	10.1
Genitourinary system	17.6	3.6	17.2	3.7	17.2	3.9	17.9	3.1	18.9	3.6
Complication of pregnancy, child birth and the puerperium	10.7	2.2	10.8	2.3	8.9	2.0	13.2	2.3	11.4	2.2
Skin and subcutaneous tissue	24.8	5.1	23.3	5.0	19.5	4.4	31.7	5.4	31.4	6.0
Musculoskeletal system and connective tissue	16.1	3.3	18.4	3.9	13.4	3.1	19.2	3.3	14.9	2.9
Congenital anomalies	0.3	0.1	0.2	0.0	0.4	0.1	0.2	0.0	0.2	0.0
Certain causes of perinatal morbidity and mortality	2.1	0.4	3.1	0.7	1.7	0.4	1.3	0.2	2.8	0.5
Symptoms and ill-defined conditions	95.7	19.4	91.0	19.4	89.3	20.3	113.2	19.2	93.3	17.9
Accidents, poisoning and violence	36.4	7.4	35.4	7.6	26.0	5.9	53.4	9.1	39.8	7.6

*Note: 1. Number of outpatients from Rural Health Service Units, Office of the Permanent Secretary, Ministry of Public Health
2. Report number 504 is the report of outpatients by 17 cause groups of Central Information Center, Ministry of Public Health*

Source: Ministry of Public Health. Public Health Statistics, 1982, p. 196

Table 2.10 Morbidity rate (per 1,000 population) and percentages of 17 causes of disease according to report no. 504 (outpatient report), Thailand, 1982-1985

Cause of diseases	1982		1983		1984		1985	
	Rate	Percent	Rate	Percent	Rate	Percent	Rate	Percent
Total	474.5	100.0	512.5	100.0	577.9	100.0	565.8	100.0
Infectious diseases	53.9	11.3	56.2	11.0	62.6	10.8	60.7	10.7
Neoplasma	1.8	0.4	2.1	0.4	2.5	0.4	2.2	0.4
Endocrine, nutritional and metabolic diseases	11.3	2.4	12.3	2.4	14.3	2.5	14.1	2.5
Blood and blood forming organs	5.2	1.1	5.0	1.0	4.9	0.8	4.7	0.8
Mental disorder	15.4	3.2	15.8	3.1	16.7	2.9	16.4	2.9
Nervous system and sense organs	18.5	3.9	20.0	3.9	23.2	4.0	22.3	3.9
Circulatory system	11.6	2.4	12.6	2.4	14.2	2.4	14.0	2.5
Respiratory system	100.2	21.1	110.8	21.6	127.5	22.1	136.3	24.1
Digestive system	59.4	12.5	64.9	12.7	74.6	12.9	73.1	12.9
Genitourinary system	17.0	3.6	18.8	3.7	21.5	3.7	21.2	3.7
Complication of pregnancy, child birth and the puerperium	10.5	2.2	10.3	2.0	11.1	1.9	9.3	1.6
Skin and subcutaneous tissue	24.1	5.1	27.4	5.3	32.5	5.6	30.7	5.4
Musculoskeletal system and connective tissue	15.3	3.2	18.0	3.5	22.3	3.8	22.8	4.0
Congenital anomalies	20.3	0.1	0.3	0.1	0.3	0.04	0.2	0.04
Certain causes of perinatal morbidity and mortality	2.3	0.5	1.9	0.4	1.6	0.3	1.6	0.3
Symptoms and ill-defined conditions	93.1	19.6	96.4	18.8	104.1	18.0	96.4	12.0
Accidents, poisoning and violence	34.9	7.4	39.7	7.7	44.1	7.6	39.8	7.0

Note: Data by fiscal year

Source: Ministry of Public Health. Public Health Statistics, 1982-1985

Table 2.11 Percent and rate (per 1,000 population) of inpatients by cause of diseases according to report no.505, 1983-1984

Order	Code	Cause of diseases	1983		1984	
			%	Rate	%	Rate
		Total	100	47.11	100	51.01
1	008,009	Enteritis and other diarrhoeal diseases	7.4	3.46	6.0	3.07
2	800-807	All other accidents	4.2	1.96	4.1	2.07
3	810-825	Motor vehicle accident	3.5	1.66	3.5	1.78
4	084	Malaria	2.9	1.38	3.5	1.78
5	001-139	All other infective and parasitic diseases	3.4	1.59	2.9	1.50
6	065	Haemorrhagic fever	1.0	0.45	2.5	1.29
7	490-493	Bronchitis, emphysema and asthma	2.5	1.18	2.5	1.29
8	531-534	Peptic ulcer	2.4	1.12	2.3	1.19
9	480-486	Pneumonia	2.5	1.16	2.2	1.10
10	630-639	Abortion	2.0	0.93	2.1	1.04
11	540-543	Appendicitis	1.6	0.76	1.7	0.85
12	290-299, 300-303, 305-316	Psychoses and mental disorders	1.5	0.71	1.3	0.68
13	680-709	Disease of the skin and subcutaneous tissue	1.5	0.69	1.3	0.66
14	010-012	Tuberculosis of the respiratory system	1.1	0.50	1.1	0.55
15	401-405	Hypertensive disease	1.0	0.47	1.0	0.51
16	280-285	Anaemia	0.9	0.40	1.0	0.49
17	420-429	Other forms of heart disease	0.7	0.33	0.8	0.40
18	580-587	Nephritis and nephrosis	0.8	0.36	0.8	0.39
19	140-208, 230-234, 235-238, 239	Malignant neoplasms	0.6	0.29	0.7	0.36
20	487	Influenza	0.8	0.37	0.7	0.36

The morbidity survey data were based on incidence during the one month prior to the survey date. The incidence rate per 1,000 population per month is shown in Table 2.12. The top leading illness is infectious diseases at the rate of 41.5 per 1,000 population. The next leading causes of illness are diseases of the respiratory system (30.4/1,000), diseases of the digestive system (20.9/1,000), and diseases of the circulatory system (10.5/1,000). The groups of diseases which have similar incidence rates of about 5 per 1,000 population are endocrine disturbance, diseases of urinary tract and sex organ, and illness from accidents, injuries and violence. The five leading groups of diseases from the Public Health Statistics Report are quite similar to those leading groups of diseases from the morbidity survey data although the order and magnitude are different.

There is an urban/rural difference of disease occurrence. The incidence rate of infectious diseases, diseases of eye and ear, and diseases of urinary tract and sex organs are higher among rural population, while the incidence rate of endocrine disturbance, diseases of nervous system, and diseases of circulatory system are higher among the urban population than the rural population. In both urban and rural areas, it is apparent that the magnitude of infectious disease problems is higher than that of non-infectious disease problems (Prasartkul et al 1985).

From the cross-sectional survey in 1985, the leading causes of morbidity in the central region were accidents, injuries and violence (9.8/1,000/month) and diseases of the nervous system (7.8/1,000/month). The highest rate in the north was endocrine disturbance (10.6/1,000/month) and for the northeast, the infectious diseases contributed the highest morbidity rate in that region (53.2/1,000/month). While in the south region the highest disease rate was for diseases of the respiratory system (39.9/1,000/month), a similar disease pattern as the diseases of the northeast. The incidence rate for endocrine disturbance in Bangkok is nearly equal to that of the northern region. The disease patterns of all regions are relatively similar for the first four leading groups of diseases.

Table 2.12 Diagnosis of illness (per 1,000 population) per month by place of residence, 1985

Diagnostic	Whole					North-		
	Kingdom	Urban	Rural	Bangkok	Central	North	east	South
Infectious diseases	41.5	24.9	45.3	25.5	46.5	30.9	53.2	35.8
Malignancy (all types)	0.7	0.6	0.7	0.6	1.1	0.5	0.6	0.6
Benign growth	1.1	1.1	0.5	1.4	0.6	0.3	-	1.3
Endocrine disturbance	5.0	10.3	3.8	9.2	4.6	10.6	2.1	1.9
Diseases of blood and blood forming organ	0.8	0.8	0.8	1.1	0.6	1.0	0.5	1.0
Mental health	0.6	0.2	0.7	0.2	0.2	0.3	0.8	1.5
Diseases of nervous system	3.8	6.0	3.3	6.9	7.8	3.3	1.7	3.6
Diseases of eye and ear	5.5	3.0	6.1	3.2	8.9	6.8	4.4	2.8
Diseases of circulatory system	10.5	18.5	8.7	20.7	12.5	17.2	4.3	3.2
Diseases of respiratory system	30.4	29.4	30.6	30.7	38.1	27.4	21.4	39.9
Diseases of digestive system	20.9	20.4	21.0	20.7	29.2	18.6	19.6	13.6
Diseases of urinary tract and sex organs	5.1	3.0	5.6	2.6	5.7	5.2	6.0	4.4
Abortion	0.1	0.1	0.1	0.2	-	0.3	0.1	-
Diseases due to obstetric causes	0.1	-	0.1	-	0.1	0.2	-	-
Diseases of skin and subcutaneous tissue	5.9	5.1	6.1	6.1	5.6	4.3	6.8	6.2
Diseases of muscles and skeleton and connected tissue	3.4	5.5	3.0	6.5	3.8	3.9	2.1	2.3
Accidents, poisoning and violence	4.9	4.4	5.0	3.7	9.8	5.0	2.4	3.6
Ill defined symptoms	21.6	9.4	23.7	9.7	21.6	21.0	20.6	30.1
Total sample population	36611	8426	28185	6194	8090	6344	10699	5284

Note : Incidence during one month prior to the survey data (April - May 1985)

Source : Prasartkul et al 1985

5. MORTALITY

Mortality statistics can reveal much about the health of the population of a country. For example, the infant mortality rate is generally regarded as a useful measure of the standard of living; life expectations at birth and at subsequent ages are often cited as an indicator of a population's health. Cause-specific death rates are also helpful in the allocation of health priorities. But before interpretation of mortality differences can be made, one must bear in mind the quality of data mentioned in the previous chapter, such as different proportions of death which may be inaccurately certified; there may have been changes in classification of diseases, changes in the accuracy of diagnosis or changes in the accuracy and completeness of the census.

5.1 Vital Statistics

The crude rate of natural increase is the gap between the crude birth and the crude death rates. It does not include the effect of migration. The natural increase rate and vital index are shown in Table 2.13. During the period from 1951 to 1965, they were increasing but since then they have been on a decline. The expectation of life at birth and at five-year of age are shown in Table 2.14. Male and female life expectancies during 1980-1985 are 60.8 and 64.8 years. Females can now expect to live about 4 years longer than males. From 1970 to 1980, men and women had an increased expectation of life of about 3 years.

Some vital statistics rates are shown in Table 2.15. In 1983, the stillbirth rate was 0.8, perinatal death rate was 4.0, neonatal death rate was 5.0, infant death rate was 12.4 and maternal death rate was 0.6 per 1,000 livebirths. In spite of a continuous downward trend in infant mortality in the last 30 years, the current infant death rate remains high comparing to that of developed countries. The corrected infant mortality rate for underenumeration was higher than those shown in Table 2.15. It was estimated to be 48 per 1,000 in 1980 and 45 per 1,000 in 1984 (Prasartkul 1985).

Table 2.13 Number and rate (per 1,000 population) of livebirths and deaths, natural increase and vital index, Thailand, 1951-1983

Year	Number		Rate		Natural increase	Vital index
	Live-births	Deaths	Live-births	Death		
1951	552741	193897	27.3	9.6	17.7	285
1952	573460	189211	27.4	9.0	17.4	303
1953	607188	183066	28.1	8.5	17.6	332
1954	681192	192595	30.6	8.6	22.0	354
1955	694985	187666	30.3	8.3	22.0	370
1956	773756	202017	32.7	8.5	24.2	383
1957	777436	218142	31.9	9.0	22.9	356
1958	790155	208866	31.6	8.3	23.3	378
1959	861380	206129	33.5	8.0	25.5	418
1960	915538	221853	34.7	8.4	26.3	413
1961	913805	210709	33.7	7.8	25.9	434
1962	973634	221157	35.0	7.9	27.1	440
1963	1020051	233192	35.7	8.2	27.5	437
1964	1119715	231095	38.1	7.9	30.2	485
1965	1117698	216830	36.6	7.1	29.5	515
1966	1085594	236243	35.0	7.6	27.4	460
1967	1116424	230622	35.0	7.2	27.8	484
1968	1200131	232116	36.6	7.1	28.5	517
1969	1133526	243444	33.6	7.2	26.4	466
1970	1145293	223899	31.5	6.2	25.3	511
1971	1221228	227990	32.7	6.1	26.6	536
1972	1189950	248676	30.9	6.5	24.4	479
1973	1167272	239151	29.5	6.0	23.5	488
1974	1185869	246459	29.1	6.1	23.0	481
1975	1132416	234550	27.1	5.6	21.5	483
1976	1166292	237062	27.2	5.5	21.7	492
1977	1079331	236854	24.6	5.4	19.2	456
1978	1040218	241146	23.1	5.4	17.7	431
1979	1073436	241111	23.3	5.2	18.1	445
1980	1077300	247970	23.2	5.3	17.9	434
1981	1062238	239423	22.4	5.0	17.4	444
1982	1075632	247402	22.2	5.1	17.1	435
1983	1055802	252592	21.3	5.1	16.2	418

Note : Vital index or birth death ratio is number of livebirths per 100 deaths

Source : Modified from Division of Health Statistics, Office of the Permanent Secretary, Ministry of Public Health. Public Health Statistics, 1980-1983

Table 2.14 Expectation of life at birth and 5 years of age, by sex, projected for 1970-2000

Year	Expectation of life at birth		Expectation of life at 5 years of age	
	Male	Female	Male	Female
1970-1975	57.73	61.57	59.34	62.99
1975-1980	59.25	63.13	60.20	63.94
1980-1985	60.77	64.76	61.05	64.86
1985-1990	62.24	66.19	61.83	65.68
1990-1995	63.56	67.60	62.57	66.44
1995-2000	64.83	68.88	63.26	67.10

Source : Report of Working Group on Population Projections, National Statistical Office, July 1981

Table 2.15 Number and rate (per 1,000 livebirths) of stillbirths, perinatal deaths, infant deaths, and maternal deaths, 1951-1983

Year	Stillbirths		Perinatal deaths		Neonatal deaths		Infant deaths		Maternal deaths	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1951	867	1.6	-	-	10504	19.0	36100	65.3	3667	6.6
1952	976	1.7	-	-	9673	16.9	36034	62.8	3662	6.4
1953	980	1.6	5726	9.4	10365	17.1	39397	64.9	3632	6.0
1954	1080	1.6	6782	10.0	12151	17.8	43275	63.5	3626	5.3
1955	1142	1.6	6783	9.8	11804	17.0	38998	56.1	3807	5.5
1956	1100	1.4	7203	9.3	12794	16.5	42747	55.2	4152	5.4
1957	991	1.3	7048	9.1	13225	17.0	47963	61.7	3839	4.9
1958	1168	1.5	6351	8.0	11334	14.3	42779	54.1	3756	4.8
1959	1648	1.9	6559	7.6	11284	13.1	40587	47.1	3964	4.6
1960	1557	1.7	6822	7.5	11829	12.9	44793	48.9	3855	4.2
1961	1651	1.8	6421	7.0	11084	12.1	46575	51.0	3646	4.0
1962	1889	1.9	6779	7.0	11463	11.8	43489	44.7	3644	3.7
1963	1849	1.8	6635	6.5	10851	10.6	38696	37.9	3674	3.6
1964	1589	1.4	6317	5.6	10920	9.8	42358	37.8	3553	3.2
1965	1846	1.6	6247	5.6	10924	9.0	34924	31.2	3483	3.1
1966	2310	2.1	6340	5.6	9477	8.7	36372	33.5	3237	3.0
1967	1866	1.7	5939	5.3	9455	8.5	31097	27.9	3150	2.8
1968	1914	1.6	5741	4.8	9102	7.6	31853	26.5	3200	2.7
1969	1826	1.6	5486	4.8	8273	7.3	29705	26.2	2927	2.6
1970	1731	1.5	5546	4.8	8394	7.3	29252	25.5	2589	2.3
1971	1588	1.3	4705	3.9	7193	5.9	27495	22.5	2559	2.1
1972	1986	1.7	6356	5.3	8921	7.5	32094	27.0	2646	2.2
1973	1495	1.3	4720	4.0	7061	6.1	30013	25.7	2154	1.9
1974	1729	1.5	5441	4.6	8066	6.8	30931	26.1	2034	1.7
1975	1576	1.4	5233	4.6	7157	6.3	29436	26.0	1944	1.7
1976	1654	1.4	7026	6.0	9974	8.6	29752	25.5	1738	1.5
1977	1880	1.7	4826	4.5	7868	5.4	17499	16.2	1391	1.3
1978	1609	1.5	5089	4.8	6462	6.2	17218	16.6	1355	1.3
1979	1469	1.4	4882	4.5	5834	5.4	15224	14.2	1105	1.0
1980	1193	1.1	4652	4.3	5723	5.3	14286	13.3	1061	1.0
1981	1150	1.1	4420	4.2	5369	5.1	13305	12.5	863	0.8
1982	1269	1.2	4647	4.3	5238	4.9	13286	12.4	749	0.7
1983	861	0.8	4260	4.0	5299	5.0	13096	12.4	670	0.6

Source : Modified from Division of Health Statistics, Office of the Permanent Secretary, Ministry of Public Health, Public Health Statistics, 1980-1983

5.2 Leading Causes of Death

The first 20 leading cause groups of death according to the ICD Basic Tabulation List, ninth revision given as rates per 100,000 population are shown in Table 2.16. Since 1980, it has been shown that the first five leading cause groups of death have been diseases of pulmonary circulation and other forms of heart disease (31.2/100,000), diseases of the digestive system other than oral cavity, salivary glands and jaws (22.4/100,000), other accidents including late effect (20.4/100,000), diseases of the respiratory system other than the upper respiratory tract (18.0/100,000), and homicide and injury purposely inflicted by other persons (16.6/100,000).

Leading cause groups of death which show an upward trend from 1979 to 1983 are malignant neoplasms of other and unspecified sites increasing from 9.5 to 13.3 per 100,000 population, cerebrovascular diseases increasing from 10.3 to 11.8, malignant neoplasm of digestive organs and peritoneum increasing from 5.6 to 6.4, diseases of the urinary system increasing from 5.6 to 6.9, endocrine and metabolic diseases including immunity disorders increasing from 2.8 to 3.8, and ischemic heart disease increasing from 0.9 to 2.0.

Leading cause groups of death which show a downward trend from 1979 to 1983 are transport accidents decreasing from 15.4 to 13.3 per 100,000 population, tuberculosis from 15.1 to 11.2, diseases of nervous system from 12.1 to 10.7, diseases of the upper respiratory tract from 28.0 to 2.5 (an abrupt decline from 1979 to 1980 deserves special attention for further investigation), and nutritional deficiencies from 2.6 to 1.4.

5.3 Age Differentials of Leading Causes of Death

Age is one of the major components affecting the causes of mortality. Different age groups have different leading causes of death; they are shown in Tables 2.17 and 2.18.

The leading causes of death among infants are certain conditions originating in the perinatal period (278.1/100,000), pneumonia (89.5/100,000), diseases of digestive system (70.1/100,000) and diarrheal diseases (47.5/100,000). The trend of the last four leading causes of death has been decreasing since 1979. The congenital anomalies death rate was 45.7/100,000, and the rate for upper respiratory infections was 38.0/100,000 in 1982.

In early childhood (1-4 years), the major causes of death are accidents, poisoning and violence (25.4/100,000), upper respiratory infections (17.4/100,000), diarrheal diseases (16.2/100,000), and pneumonia (17.1/100,000).

For the age groups 5-14, 15-24 and 25-44, accidents, poisoning, and violence is the first leading cause of death; its death rate is highest in the age group 25-44 and has been slightly decreasing or relatively stable over this four-year period.

For the age group 45-64 and over 65, malignant neoplasm (all forms) is the first leading cause of death. The death rates due to malignancy in these age groups are high and increasing over time. There is also a striking upward trend in heart disease death rate in the age group of 65 and over which increased from 252.1 in 1979 to 457.1/100,000 in 1982.

Table 2.16 First 20 leading cause groups of death by rate (per 100,000 population) according to ICD Basic Tabulation List, 9th revision, 1979-1983

Cause of death	1979		1980		1981		1982		1983	
	Order	Rate	Order	Rate	Order	Rate	Order	Rate	Order	Rate
Pulmonary circulation and other forms of heart disease (415-429)	2	27.7	1	29.9	1	29.7	1	32.2	1	31.2
Digestive system other than oral cavity, salivary glands and jaws (530-579)	4	24.2	3	22.5	3	22.7	2	24.2	2	22.4
Other accident, including late effect (E 900-E 929)	5	18.8	4	19.3	4	18.3	5	17.7	3	20.4
Respiratory system other than the upper respiratory tract (466, 480-519)	6	16.6	5	15.8	5	16.5	4	18.2	4	18.0
Homicide and injury purposely inflicted by other persons (E 960-E 969)	3	26.2	2	25.1	2	26.3	3	22.0	5	16.6
Malignant neoplasm of other and unspecified sites (190-199)	12	9.5	9	11.2	8	11.4	7	12.8	6	13.3
Transport accidents (E 800-E 848)	7	15.4	7	14.4	6	14.3	6	13.6	7	13.3
Cerebrovascular (430-438)	11	10.3	10	10.8	9	10.9	9	11.5	8	11.8
Tuberculosis (010-018)	8	15.1	6	14.5	7	11.9	8	12.0	9	11.2
Nervous system (320-359)	10	12.1	8	11.5	9	10.9	10	10.6	10	10.7
Intestinal infections (001-009)	9	12.5	11	9.3	11	7.5	11	6.7	11	7.3
Urinary system (580-599)	14	5.6	13	6.1	14	5.8	13	6.4	12	6.9
Suicide and self-inflicted injury (E 950-E 959)	13	6.8	12	7.4	12	7.3	11	6.7	13	6.6
Malignant neoplasm of digestive organs and peritoneum (150-159)	14	5.6	15	5.8	13	6.3	14	6.2	14	6.4
Hypertensive diseases (401-405)	16	3.7	16	4.2	15	4.1	15	3.7	15	3.6
Endocrine and metabolic diseases, immunity disorders (240-259, 270-279)	17	2.8	17	3.1	17	3.2	16	3.6	16	3.8
Malignant neoplasm of respiratory and intrathoracic organs (160-165)	19	2.2	18	2.4	18	2.4	18	2.8	17	2.6
Upper respiratory tract (460-465, 470-478)	1	28.0	14	5.9	16	4.0	17	3.5	18	2.5
Ischemic heart disease (410-414)	20	0.9	20	1.1	20	1.2	20	1.5	19	2.0
Nutritional deficiencies (260-269)	18	2.6	19	1.8	19	1.7	19	1.6	20	1.4

Source : Modified from Division of Health Statistics, Office of the Permanent Secretary, Ministry of Public Health.
Public Health Statistics 1980-1983

Table 2.17 Leading causes of death (rate per 100,000 population) among infants and early childhood, Thailand, 1979-1982

Cause of death	1979	1980	1981	1982
Under 1				
Certain conditions originating in the perinatal period	266.3	306.0	290.0	278.1
Upper respiratory tract infections	146.4	52.5	34.9	38.0
Pneumonia	105.9	86.4	95.7	89.5
Diseases of digestive system other than oral cavity, salivary glands and jaws	9.9	75.8	66.3	70.1
Diarrheal diseases	97.1	74.5	63.5	47.5
Convulsions	-	16.9	-	19.7
Diseases of the nervous system	29.2	26.1	23.2	20.5
Viral diseases	14.0	20.1	16.3	12.3
Congenital anomalies	43.0	45.3	38.0	45.7
Diphtheria	12.7	11.1	9.7	9.7
Age 1-4				
Upper respiratory tract infections	67.2	20.2	19.1	17.4
Diarrheal diseases	27.3	19.6	18.2	16.2
Accidents, poisoning and violence	26.4	30.9	27.1	25.4
Pneumonia	20.8	18.4	15.8	17.1
Malaria	11.8	9.2	10.0	9.6
Convulsions	6.7	5.1	3.4	4.6
Diphtheria	6.7	5.1	2.6	4.1
Diseases of the stomach and duodenum	6.8	5.2	5.1	4.7
Nutritional deficiencies	3.4	2.7	2.5	2.4
Diseases of the heart	6.3	7.8	6.2	9.0

Note: Rate of under one year of age is calculated per 100,000 live births

Source: Prasartkul 1985

Table 2.18 Leading causes of death (rate per 100,000 population) by age group, Thailand, 1979-1982

Cause of death	1979	1980	1981	1982
Age 5-14				
Accidents, poisoning and violence	18.3	17.4	16.7	15.0
Malaria	5.8	5.2	5.6	5.2
Diarrheal diseases	4.8	3.3	2.5	2.2
Pneumonia	3.3	3.0	2.2	2.5
Diseases of the heart	3.3	3.8	3.0	4.1
Malignant neoplasm (all forms)	2.0	2.0	2.0	2.3
Age 15-24				
Accidents, poisoning and violence	44.4	43.9	41.1	39.2
Malaria	8.5	9.3	9.7	8.3
Diseases of the heart	10.8	11.6	11.3	11.4
Malignant neoplasm (all forms)	4.6	4.5	4.5	4.6
Tuberculosis of respiratory system	2.3	2.4	1.9	1.9
Pneumonia	2.4	2.6	2.2	2.3
Age 25-44				
Accidents, poisoning and violence	46.7	45.6	44.8	43.9
Diseases of the heart	25.4	27.0	25.6	26.7
Malignant neoplasm (all forms)	16.3	18.2	21.8	19.2
Tuberculosis of respiratory system	12.6	10.8	9.1	8.7
Malaria	8.0	7.6	8.4	7.7
Pneumonia	4.2	4.5	3.8	3.9
Age 45-64				
Malignant neoplasm (all forms)	93.2	103.6	108.9	113.2
Tuberculosis of respiratory system	65.6	63.9	51.1	52.5
Diseases of the heart	93.8	99.4	99.7	110.0
Accidents, poisoning and violence	51.9	52.1	48.0	47.6
Pneumonia	16.1	18.5	16.2	17.5
Malaria	12.0	12.2	12.9	11.1
Age 65 and over				
Malignant neoplasm (all forms)	159.4	174.0	180.7	295.2
Tuberculosis of respiratory system	112.6	109.7	97.0	144.0
Accidents, poisoning and violence	72.8	68.4	71.9	97.3
Pneumonia	47.3	52.5	50.4	77.0
Diseases of the heart	252.1	273.1	290.0	475.1
Malaria	13.4	13.5	14.0	18.0

Source: Prasartkul 1985

5.4. Sex Differentials of Leading Causes of Death

Males and females experience differences in mortality from many diseases. Standardized death rates are higher for males than for females. The selected leading causes of death by sex are shown in Table 2.19. All sex ratios (M:F) except for nutritional deficiencies are in the range of 1.25 to 2.80. There is a marked sex difference in accidents, poisonings and violence mortality (sex ratio 2.80 in 1983). More males die from accidents than other causes. The sex ratios of these selected leading causes of death have remained relatively unchanged during this five-year period.

The comparison of causes of death by sex from sample population survey is shown in Table 2.20. Death rates for tuberculosis, malignancy, hypertensive diseases, cerebrovascular accidents, pneumonia and bronchitis and asthma, cirrhosis of liver and hepatitis, accidents and injury are higher in males than females; while diabetes mellitus, senility without psychosis are higher in females than males.

5.5. Regional Differentials of Leading Causes of Death

It is apparent that death rates from communicable diseases are higher in the northeast, the north and the south whereas death rates from non-communicable diseases are higher in the central region, and Bangkok. The difference may be from better case-finding, referral to well-equipped hospitals in the central region and Bangkok, or from the poorer hygienic conditions and less adequate health care in the northeast, north and south (Table 2.21).

Table 2.19 Selected leading causes of death (rate per 100,000 population) by sex, 1979-1983

Cause of death	1979	1980	1981	1982	1983
Diseases of heart					
Male	34.10	37.60	37.80	40.90	41.10
Female	23.40	25.20	25.00	27.50	26.40
Ratio rate male : female	1.46	1.49	1.51	1.49	1.56
Accidents, poisoning and violence					
Male	52.90	52.70	51.70	49.50	52.30
Female	19.00	13.90	17.50	17.50	18.70
Ratio rate male : female	2.78	2.79	2.95	2.83	2.80
Malignant neoplasm, all forms					
Male	23.60	26.20	28.00	29.30	30.00
Female	18.40	21.00	21.40	23.00	24.00
Ratio rate male : female	1.28	1.25	1.31	1.27	1.25
Tuberculosis of respiratory system					
Male	19.10	18.70	15.70	15.80	14.60
Female	10.10	9.90	7.80	8.00	7.50
Ratio rate male : female	1.89	1.89	2.01	1.98	1.95
Pneumonia					
Male	11.80	11.80	10.60	11.40	11.80
Female	8.40	8.10	7.30	7.80	8.30
Ratio rate male : female	1.40	1.46	1.45	1.46	1.42
Malaria					
Male	9.90	10.00	10.80	9.60	7.40
Female	6.50	6.10	6.40	6.00	4.40
Ratio rate male : female	1.52	1.64	1.69	1.60	1.68
Diarrheal diseases					
Male	12.40	9.40	7.50	6.60	6.60
Female	9.50	7.10	6.00	5.00	5.10
Ratio rate male : female	1.31	1.32	1.25	1.32	1.29
Diseases of the stomach and duodenum					
Male	7.50	6.10	5.80	5.10	5.20
Female	4.70	3.40	3.30	2.90	2.60
Ratio rate male : female	1.60	1.79	1.76	1.76	2.00
Nutritional deficiencies					
Male	2.40	2.00	1.70	1.50	1.50
Female	2.60	1.70	1.70	1.80	1.40
Ratio rate male : female	0.92	1.18	1.00	0.83	1.29
Others					
Male	432.07	441.49	422.10	423.10	414.00
Female	337.67	349.32	321.56	330.49	314.19
Ratio rate male : female	1.28	1.26	1.31	1.28	1.32

Source: Prasartkul 1985

Table 2.20 Death rate per 100,000 population (all ages) on causes of death by sex, Thailand, 1985-1986

Cause of death	Male	Female
Diarrheal diseases	12.60	15.40
Tuberculosis	23.80	12.70
Tetanus	2.10	-
Rabies	1.40	-
All other infectious diseases	2.10	0.60
Malaria	3.50	1.30
Malignancy	48.40	40.10
Diabetes mellitus	6.30	12.00
Psychosis/drug dependence	6.30	0.60
Meningitis, encephalitis, epilepsy	3.50	5.30
Heart diseases, hypertensive diseases,	47.00	31.40
Cerebrovascular accidents	30.10	21.40
Pneumonia, bronchitis, asthma	35.80	24.10
Peptic ulcer, appendicitis, intestinal obstruction	9.80	10.70
Cirrhosis of liver, hepatitis	24.50	6.70
Nephrosis, prostrate	9.10	11.40
Obstetric and perinatal causes	22.40	16.00
Pyrexia of unknown origin	14.70	18.00
Ill-defined cause	46.30	24.10
Accidents and injury	58.90	24.70
Suicide	11.20	4.80
Homicide	3.30	6.00
Senility without psychosis	64.50	74.90
Tyroid	-	2.00
Anemia	0.70	3.30
Congenital anomalies	1.40	-
Haemorrhagic fever	7.70	2.70
Total sample population	142622	149590

Source: Prasartkul 1985

Table 2.21 Death rate per 100,000 population (all ages) on causes of death by region, Thailand, 1983-1986

Cause of death	Whole Kingdom	Bangkok	Central	North	Northeast	South
Diarrheal diseases	14.0	10.6	14.0	9.1	17.7	17.6
Tuberculosis	18.1	5.3	17.2	21.2	17.7	24.6
Tetanus	1.0	-	-	3.0	1.5	-
Rabies	0.7	-	1.6	-	-	1.8
All other infectious diseases	1.4	-	1.6	3.0	1.5	-
Malaria	2.4	2.7	1.6	1.5	5.9	-
Malignancy	44.1	58.4	40.6	48.6	41.4	33.4
Diabetes mellitus	9.2	8.0	9.4	9.1	10.3	8.8
Psychosis/drug dependence	3.4	5.3	4.7	1.5	3.0	2.5
Meningitis, encephalitis, epilepsy	4.4	-	4.7	6.1	4.4	5.3
Heart diseases, hypertensive diseases	39.0	47.8	37.5	54.6	32.5	24.6
Cerebrovascular accidents	25.7	13.3	28.1	34.9	20.7	26.3
Pneumonia, bronchitis, asthma	29.8	13.3	20.3	42.5	26.6	40.4
Peptic ulcer, appendicitis, intestinal obstruction	10.3	2.7	1.6	27.3	8.9	7.0
Cirrhosis of liver, hepatitis	15.4	15.9	9.4	15.2	3.1	3.5
Nephrosis, prostrate	10.3	-	6.2	24.3	8.9	7.0
Obstetric and perinatal causes	19.2	5.3	9.4	15.2	36.9	22.8
Pyrexia of unknown origin	16.4	8.0	12.5	18.2	22.2	17.6
Ill-defined cause	34.9	18.6	43.7	31.9	23.7	52.7
Accidents and injury	41.4	31.9	31.2	75.9	29.6	33.4
Suicide	7.9	5.3	12.5	6.1	11.8	1.8
Homicide	19.2	10.6	20.3	19.7	7.4	36.9
Senility without psychosis	69.8	29.2	87.4	74.4	59.1	84.3
Tyroid	1.0	-	-	3.0	1.5	-
Anemia	2.0	2.7	6.2	1.5	-	-
Congenital anomalies	0.7	-	-	-	1.5	1.8
Haemorrhagic fever	5.1	2.7	3.1	1.5	14.8	1.7

Source: Prasartkul 1985

6. HEALTH UTILIZATION

6.1 Organization of the Ministry of Public Health

The latest reorganization of the Ministry of Public Health was in 1974 in order to give more authority to provincial administration. The Central administration was divided into 5 departments: Department of Medical Services, Department of Health, Department of Medical Sciences, Department of Communicable Disease, and Office of Food and Drug Administration. The Departments have their roles in technical support and promotion of services of the Provincial health offices through the Office of the Permanent Secretary and more decentralization of authority from the central to the provincial office (Figure 2.3).

6.2 Infrastructure

In each province, there is at least one provincial hospital. In 1975, the government set the policy to increase the coverage of community hospitals to all districts, and health centers to all tumbons. The coverage of district hospitals is 86% in 1985, and the coverage of tumbon health centers is 100% (Figure 2.4).

6.3 Health Resources

The number of medical and health personnel of each category are displayed in Table 2.22. Proportion of physicians, dentists and nurses who work in the Ministry of Public Health are 49%, 38% and 59% respectively. About 10% work in private sector. Pharmacists who work in the Ministry of Public Health amount to 24% while 50% of pharmacists work in the private sector.

The ratio between the population to medical and health personnel of each category are shown in Table 2.23. Personnel except midwives are more dense in Bangkok Metropolis than in other provinces. For example, the ratio of population to physicians and dentists in Bangkok are 7 and 11 times greater than other provinces. This is the same for distribution of beds per 10,000 population in Bangkok which was 2.5 times the density as other provinces (Table 2.24).

Table 2.22 Number of medical and health personnel of each category by type of administration, Thailand, 1984

	Physician	Dentist	Dental hygienist	Pharmacist	Nurse	Auxilliary nurse	Midwife	Junior health worker
Government	6619 (82)	1008 (76)	532 (98)	1353 (41)	26297 (83)	18029 (81)	7813 (91)	8482 (99)
Ministry of Public Health	3927 (49)	500 (38)	523 (96)	806 (24)	18655 (59)	12502 (56)	7761 (30)	8441 (98)
Other ministries	2692	508	9	547	7642	5527	52	41
State enterprises	208	59	4	206	777	312	47	3
Municipalities	341	101	-	72	1848	232	97	47
Private Services	890 (11)	158 (12)	6 (1)	1681 (50)	2905 (9)	3612 (16)	616 (7)	-
Total	8056	1326	542	3312	31827	22185	8573	8532

Note: Number in parenthesis are proportion from total number (%)

Source: Division of Health Planning, Ministry of Public Health

Figure 2.3 Organization of the Ministry of Public Health, 1985

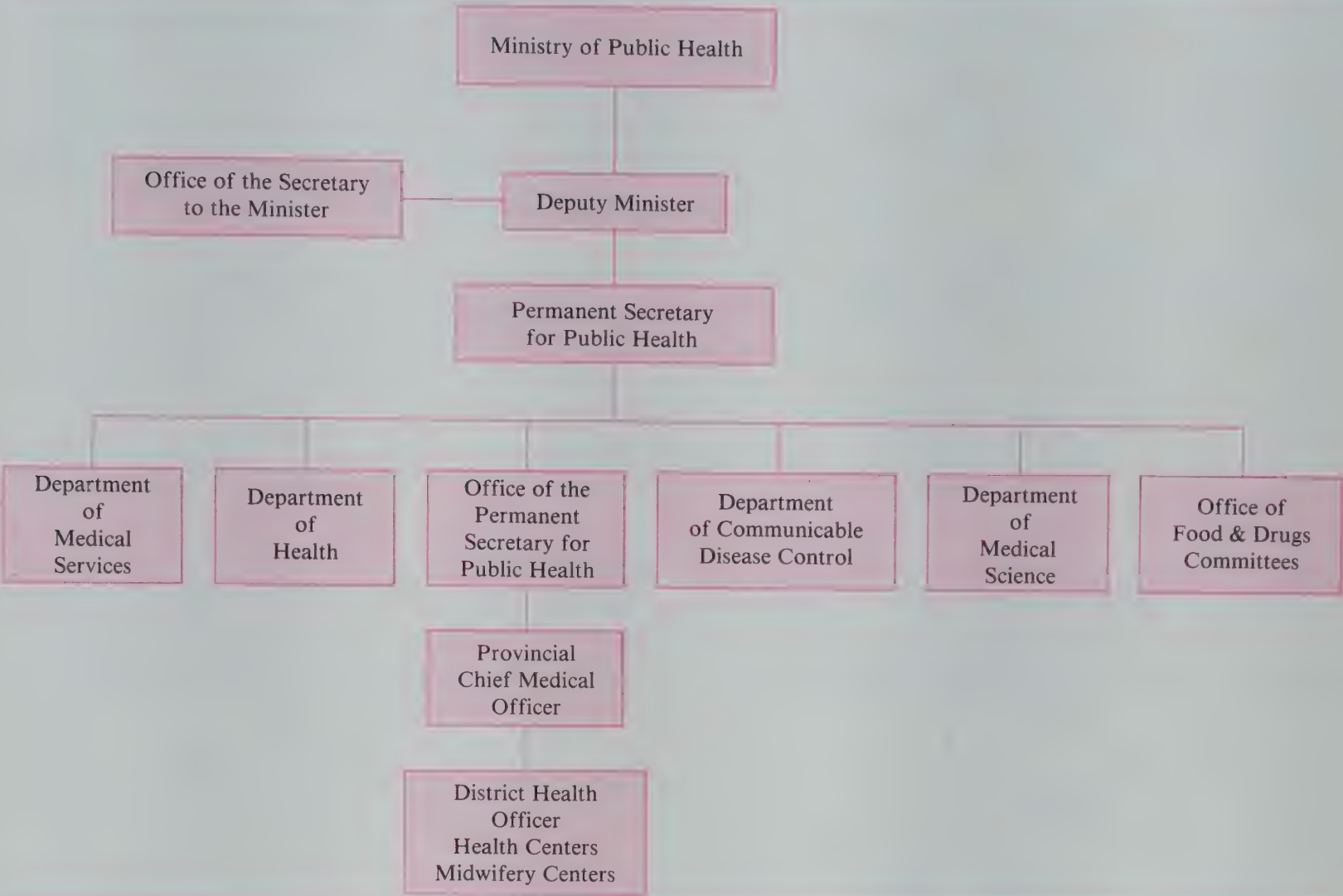


Figure 2.4 The Infrastructure of provincial health services in Thailand, 1985

Population size	Administrative level	Health Service coverage
300,000-1,000,000	73 Provinces	Provincial Hospital 73 (100%)
20,000-100,000	621 Districts	District Hospital 534 (86%)
5,000-10,000	6283 Tumbons	Health Center** 6761 (100%)
500-2,000	56671 Villages	Midwifery Center*

Sources: Division of Health Planning, Ministry of Public Health
* All Midwifery centers have been upgraded as Health Center during the Fifth Plan.
** Some Tumbons have more than one Health Center.

Table 2.23 The ratio between population to medical and health personnel in Bangkok Metropolis and other provinces, 1984

Population per physician	6254
Whole kingdom	1512
Bangkok Metropolis	10740
Other provinces	
Population per dentist	38006
Whole kingdom	7432
Bangkok Metropolis	84070
Other provinces	
Population per pharmacist	15216
Whole kingdom	2144
Bangkok Metropolis	8086
Other provinces	
Population per nurse	1583
Whole kingdom	501
Bangkok Metropolis	2224
Other provinces	
Population per midwife	5878
Whole kingdom	7536
Bangkok Metropolis	5711
Other provinces	

Source: Division of Health Planning, Ministry of Public Health

Table 2.24 Number of beds, ratio between population and beds for general service, Bangkok Metropolis and other provinces, 1984

Total beds	
Whole kingdom	70606
Bangkok Metropolis	19379
Other provinces	51227
Number of population per bed	
Whole kingdom	742
Bangkok Metropolis	354
Other provinces	868
Number of beds per 10,000 population	
Whole kingdom	13
Bangkok Metropolis	28
Other provinces	11

Source: Division of Health Statistics, Ministry of Public Health

6.4 Budget Allocation

The budget allocation for public health from government and foreign assistance, and the proportion of public health budget of the national total are displayed in Table 2.25 for the years 1971-1985. In terms of proportion of budget allocated for health development, it is apparent that there has been marked increase over the fifteen years. The proportion is small in comparison to the budget allocated to other ministries. Even including foreign assistance, the total public health budget was only 3.4 percent of the total national budget in 1971 and 4.4 percent in 1985.

However, governmental health budget is not solely allocated to the Ministry of Public Health. An ample portion is also shared by other ministries. For instance, the budget for production of health personnel is shared by the University Bureau; part of the budget for medical care delivery is readily allocated to health service outlets under various ministries and governmental enterprises. The total expenditure on health is displayed in Table 2.26. From 1976 to 1984, a relatively constant percentage of health expenditure to total government budget has been observed at approximately 6 percent.

In addition, the health expenditure as a percentage of GDP is observed to be constant over a 10-year period. However, the steadily increasing trends of the average health expenditure per capita of the total population are from 90 baht in 1976 to 228 baht in 1984. Bangkok inhabitants appear to have an average health expenditure per capita about 3 times more than the national averages as observed from the available data during 1976 to 1978.

Table 2.25 Budget allocation for public health, 1971-1985

Year	Public health (Million baht)	Percent of public health budget to national budget	Foreign assistance (Million baht)
1971	975.7	3.4	-
1972	953.1	3.3	-
1973	1023.2	3.2	-
1974	1114.3	3.1	-
1975	1533.4	3.0	90.5
1976	2725.3	4.4	176.9
1977	3520.6	5.1	169.1
1978	3405.8	4.2	205.2
1979	3976.9	4.3	329.3
1980	4494.6	4.1	455.5
1981	5671.8	4.0	889.5
1982	6652.3	4.1	369.6
1983	7902.4	4.5	386.3
1984	8617.8	4.5	-
1985	9044.3	4.4	-

Source: Division of Health Planning, Ministry of Public Health

Table 2.26 Total health expenditure from government budget as a percentage of Gross Domestic Product (GDP) per capita of total population and per capita of Bangkok population, 1976-1984

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Budget allocated to Ministry of Public Health (Million Baht)	2725.30	3520.50	3405.80	3976.90	4494.50	5571.80	6652.30	7902.40	8617.60
Total expenditure on health from government budget (Million Baht)	3889.00	4840.20	4916.30	5740.50	6856.80	8169.40	9639.20	10818.60	11648.40
Health expenditure as a percentage of total budget	6.21	7.04	6.07	6.24	6.29	5.84	6.00	6.10	6.10
Health expenditure as a percentage of GDP	1.18	1.24	1.06	1.05	1.04	1.14	1.20	1.23	-
MOPH Budget as a percentage of GDP	0.81	0.90	0.73	0.73	0.88	0.77	0.83	0.89	-
Average health expenditure per capita of total population (baht)	90.50	103.90	109.10	124.40	145.40	169.60	196.20	215.90	228.00
Average health expenditure per capita of Bangkok population (baht)	243.60	386.50	340.40	-	-	-	-	-	-

Source: Division of Health Planning, Ministry of Public Health

6.5 Overview Patterns of Utilization of Health Service

A comparison of the patterns of illness among people visiting various types of health facilities irrespective of severity are shown in Table 2.27 based on two surveys conducted by the Ministry of Public Health in 1970 and 1979. Some changes in the pattern of utilization of health services may be noted. Even though a high proportion of ill persons still buy drugs from drug stores for self treatment, this proportion has declined by about 10 percent over the last ten years. The utilization of governmental hospitals, private hospitals and clinics was the same during the two survey periods, but there was a remarkable increase in the utilization of government health centers. It is evident that the government health center has gained popularity especially among rural people over the last decade. At the same time, there has been an increase in the number, and more equitable distribution of health centers across the country from 1,900 centers in 1970 to 4,748 centers in 1979. However, 6.2 percent of ill people were still using traditional healers, particularly in rural areas.

6.5.1 Urban/rural difference

In the urban community, where modern health facilities are available and accessible, the utilization of private clinics, hospitals and governmental hospitals is about three times as great in the rural areas (Table 2.28). The proportion of ill persons in urban areas using private hospitals is somewhat lower than expected. The same was also true for health centers. The smaller proportion of rural people using hospitals reflects the unavailability and inaccessibility of these facilities.

Table 2.27 Utilization of health resources: comparison between the two surveys conducted by the Ministry of Public Health, 1970 and 1979

Types of health services	Percent	
	1970	1979
Self-treated, buy drug	51.4	42.3
Health center (with and without M.D.)	4.4	16.8
Government hospital	11.1	1.0
Private hospital and clinic	22.7	20.4
Traditional healers	7.7	6.2
Not Available, do not visit	2.7	4.2
Total	100	100

Source: Porapakham 1983

Table 2.28 Pattern of utilization of health resources for those who reported ill, classified by residence, 1979

Types of health services	Percent		
	Urban	Rural	Total
Self-treated, buy drug	36.4	44.0	42.3
Government health center	4.9	20.0	16.8
Government hospital	14.1	8.8	10.0
Private hospital	2.8	1.2	1.5
Private clinic	38.8	13.3	18.9
Traditional healers	3.0	7.1	6.2
Not available	-	5.5	4.2
Total	100.0	99.9	99.9
Sample Size	1063	3805	4868

Source: Porapakham 1983

6.5.2 Sex difference

There is no difference in the utilization of various health facilities between males and females as seen in Table 2.29. However, sex differentials in the utilization of medical services are more evident when data from the service statistics of the entire Kingdom are considered. During the period from 1972-1978, the number of outpatients who visited the provincial and municipal health facilities consistently increased. The proportion of adult outpatients remained relatively unchanged over time, with a persistently higher percentage (about 10 percent) of female patients. The higher proportion of female patients was observed both in outpatient clinics and inpatient clinics of the hospitals (Division of Health Statistics 1978).

Table 2.29 Pattern of utilization of health resources for those who reported ill, classified by sex, 1979

Type of health services	Percent distribution	
	Male	Female
Self-treated, buy drug	45.4	42.9
Health center	17.4	17.8
Government hospital	10.5	10.3
Private hospital	1.6	1.5
Private clinic	19.1	20.4
Traditional healers	6.0	7.0
Total	100.0	99.9
Sample Size*	2350	2301

*Excluded "no answer" and "do not visit"

Source: Porapakham 1983

6.6 Utilization of Maternity Service

The rate of mothers who obtained delivery service from professional or trained personnel per 1,000 livebirths reported to the Ministry of Public Health in 1982 was 503.4 (Table 2.30). The rate was highest in the central region and was lowest in the south.

The AFPH (the Accelerated Family Planning and Health Project Baseline Survey) survey data have revealed the level of utilization of maternity service along with the factors influencing the decision in usage of the service, comparing between the two rounds of the survey, 1979 and 1981. Data from the present surveys related not only to services provided by midwives but to other sources of maternity services. As can be seen in Table 2.31 during the period from 1979 to 1981, the percentage of deliveries in government hospitals and health centers increased from 59.5 to 75.3 percent in urban areas and from 26.6 to 31.9 percent in rural areas. For both urban and rural areas, the use of private clinics and homes for deliveries sharply declined coincidentally with the rise of the utilization of government facilities. A similar pattern is seen in all four regions.

According to the survey, the small group of urban women and larger group of rural women who delivered at home show an increase in the use of government employed doctors or nurses and a decrease in the use of traditional maternity services. Those who chose to deliver at home were asked why they did not use government services. (Respondents were allowed more than one response.) The reasons for not using government services for delivery are shown in Table 2.31. For urban women, the most frequent answer was the poor quality of government services. Rural women who did not go to government health centers for delivery cited the distance and lack of necessity as the main reasons. However, the percentage of those who preferred non-government services declined both in urban and rural areas, and in every region, with the highest magnitude of reduction in the northeast. The decrease in percentage of those who claimed the distance as a major barrier to using government health facilities may to some extent be due to the health inputs of the AFPH programme during the two-year study period.

When examining the accessibility to maternity services in terms of travel time and cost of delivery services, both rounds of the survey show that the urban respondents had greater access to maternity service than rural people. Most urban women took less than one hour in travelling to a delivery service place. For rural women the travel time to receive maternity service sharply increased; those who travelled one hour or more increased from 16.1 in 1979 to 39.1 percent in 1981. This pattern of increase in travelling time is seen for all regions (Table 2.32).

The increase in travelling time has been accompanied by the decrease in service cost in some areas. However, the percentage of those who paid 500 baht and over for maternity services declined in both urban and rural areas. The percentage of rural women who reported free delivery service increased slightly from 24.7 percent in 1979 to 29.5 in 1981 (Table 2.32).

Table 2.30 Rate of mothers delivered by professional or trained personnel per 100,000 livebirths, 1975-1982

Year	Whole Kingdom	North	Northeast	Central	South
1975	160.6	-	-	-	-
1976	150.1	149.3	182.8	106.4	161.4
1977	165.7	157.1	170.1	153.4	192.6
1978	179.7	176.0	195.5	145.9	223.0
1979	268.9	333.4	259.2	230.5	303.3
1980	337.3	422.5	326.9	301.8	336.1
1981	465.4	527.2	400.4	573.4	421.4
1982	503.4	526.4	459.9	615.6	436.9

Source: Division of Health Statistics, Ministry of Public Health

Table 2.31 Utilization of delivery services during the past year, urban and rural areas, 1979-1980

	1979		1980	
	Urban	Rural	Urban	Rural
Place of delivery				
Government hospital/center	59.5	26.6	75.3	31.9
Private hospital/clinic	26.1	6.9	16.7	7.5
Home	14.4	66.2	7.5	59.8
Other	0.0	0.3	0.5	0.8
Number of cases	180	645	186	535
Birth attendant for home delivery				
Government doctor or nurse	15.3	6.5	28.5	7.8
Private doctor or nurse	11.5	1.6	0.0	1.2
Traditional birth attendant	57.8	73.5	42.9	69.4
Other, relative, etc.	15.4	18.4	28.6	21.6
Number of cases	26	425	14	320
Reason for not using the government services				
Distance	20.6	43.7	9.3	34.9
Poor service	44.4	8.1	46.5	8.1
High cost	14.3	24.1	2.3	18.3
Not necessary	15.9	16.3	20.9	38.1
Unsafe	3.2	3.6	14.0	0.6
Other	1.6	4.1	7.0	0.0
Number of responses	63	442	43	361

Source: Institute for Population and Social Research, Mahidol University 1983

Table 2.32 Travelling time and cost of maternity service by urban-rural residence, 1979 and 1981

	1979		1981	
	Urban	Rural	Urban	Rural
Travel time (minutes)				
0-29	92.6	61.9	80.6	27.0
30-59	4.7	22.0	12.4	33.9
1 hour or more	2.7	16.1	7.0	39.1
Number of cases	149	218	170	207
Cost of delivery (baht)				
1-100	12.5	34.7	13.0	27.0
101-500	41.3	31.7	50.9	36.5
501-1000	16.2	6.2	14.3	4.9
1000 and over	18.6	2.7	10.9	2.1
Free of charge	11.4	24.7	10.9	29.5
Number of cases	167	635	186	536

Source: Institute for Population and Social Research, Mahidol University 1983

6.7 Utilization of Immunization Service

There are 7 kinds of vaccines which are provided by Ministry of Public Health through various health service offices at different levels. These vaccines are DPT, OPV, BCG, measles vaccine, rubella vaccine, tetanus toxoid for pregnant women, and typhoid vaccine. Some kinds of vaccines are given in school, such as dT, typhoid vaccine, BCG (booster dose) and rubella vaccine. The coverage of each vaccine is shown in Table 2.33. All vaccines except BCG, typhoid vaccine and dT are still under 75% coverage. Although the Ministry of Public Health plays a major role in providing the vaccination but other organizations, such as, Medical School, Bangkok Metropolis Administration and private sector, also contribute substantial support.

Table 2.33 Coverage of vaccination program, Thailand, 1985 and 1986

Type of vaccine	Coverage (%)	
	1985	1986
Vaccination in health service		
DPT under 1 year (3 doses)	62.4	73.8
OPV (3 doses)	61.8	72.9
BCG at birth (1 dose)	79.5	98.5
Measles vaccine (1 dose)	25.8	46.6
TT for pregnant (2 doses)	48.2	55.9
Vaccination in school		
Typhoid (1 dose)	81.5	Not available
dT (booster 1 dose)	77.5	75.7
BCG (booster 1 dose)	63.9	60.0
Rubella (1 dose)	Not available	Not available

Note: dT and BCG are the data in 1984.

Source: Division of General Communicable Diseases Control, Department of Communicable Disease Control, Ministry of Public Health, 1985

CHAPTER 3

STATISTICS ON SIGNIFICANT CAUSES OF MORBIDITY AND MORTALITY

1. INTRODUCTION

In the previous chapter, the leading causes of morbidity and mortality in Thailand were listed and rates were given. The morbidity was further categorized into an outpatient list and an inpatient list. The morbidity was broken down by sex, by rate and by region. Sometimes the leading causes in a subgroup differed from the overall list, often the first five remains the same but with a different order of ranking.

In order to improve the over all picture of the health profile, the major causes of morbidity and mortality should be investigated closely. In this chapter, epidemiological data on these significance diseases will be complied from various sources. They will be introduced in the following order:

- 1.1 injuries, mental health and drug addiction,
- 1.2 non-communicable diseases,
- 1.3 communicable diseases.

The sequence does not reflect the priorities of the diseases. For each group, morbidity and mortality statistics as well as demographic distribution are presented.

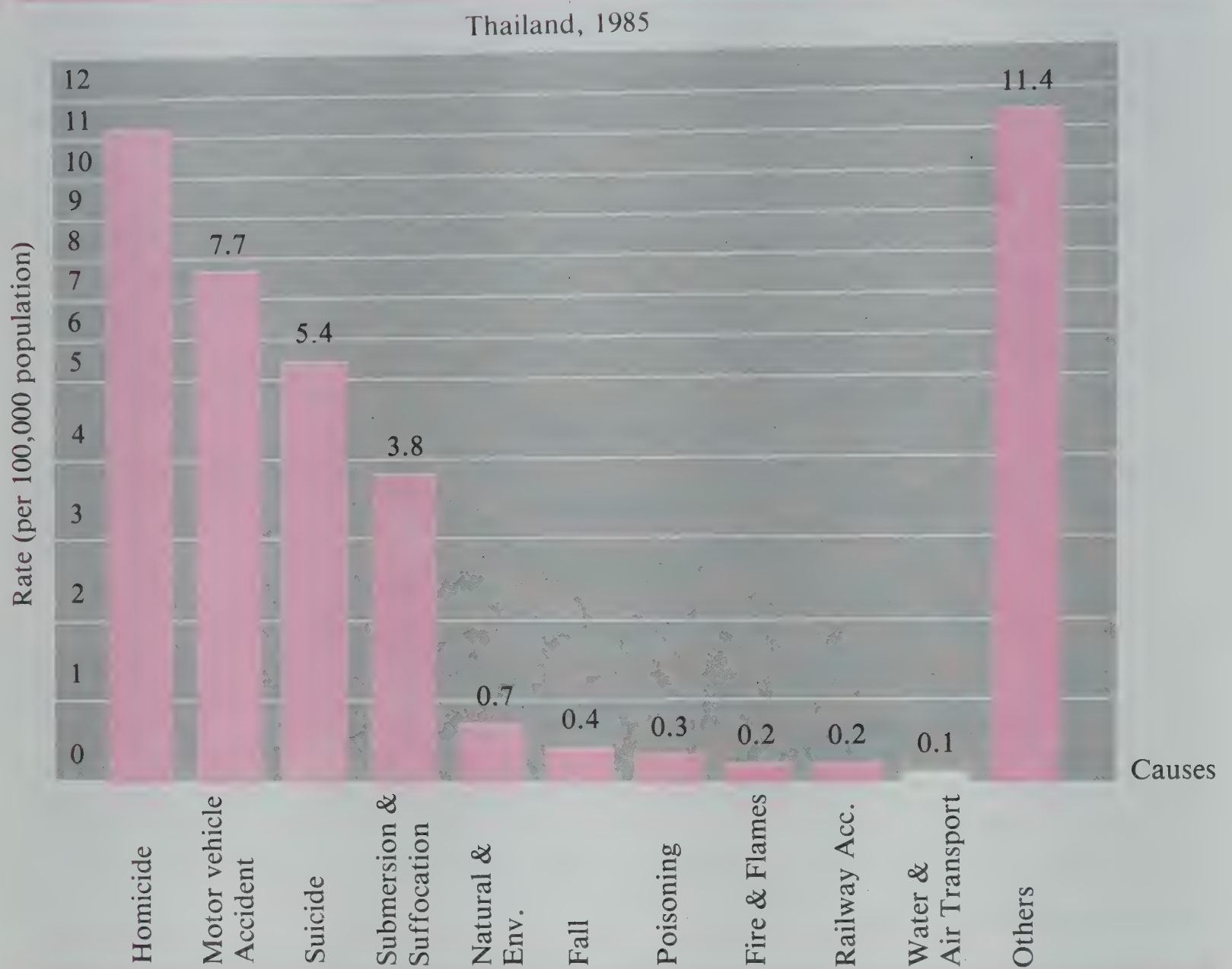
2. INJURIES

Injuries were the leading cause of death in Thailand over the past decade. Each year, more than 30,000 Thais die from injuries. The death rate was highest in 1979 at 69.4/100,000 population and declined to 41.4 in 1985. Injuries are the major killer among youngsters. Consequently, the total potential years of life lost was 516,558.

Injury is caused by acute exposure to energy, such as heat, electricity, or the kinetic energy of a crash, fall or bullet. It may be caused by the sudden absence of essentials, such as heat or oxygen. Injury may be either unintentional (accidental) or deliberate (assaultive or suicidal).

In 1985, the Division of Health Statistics reported 21,325 injury deaths. The death rate was 41.4 per 100,000 population; homicide showed highest death rate (11.2) followed by traffic accident (7.7) and suicide (5.4) (Figure 3.1).

Figure 3.1 Rate (per 100,000 population) of major causes of injury death, Thailand, 1985



Nonfatal assaultive injuries and homicides have been attributed to inadequate prevention-oriented research. Typically, they have been regarded as a “crime problem” rather than as a public health problem. On the other hand, self-inflicted injuries have been emphasized as a personality problem and therefore, much research stresses methods of treating the depressed or suicidal people. In fact, intentional injury is an important public health problem which causes more loss of potential years of life than other types of injury. Approximately 300,000 persons were lost each year during 1977-1984.

2.1 Homicide

A homicide victim is anyone who was killed by another person. It is coded under the E 960 - E 969 in ICD-9. The main source of data in this report is from the death certificates processed by the Division of Health Statistics, Ministry of Public Health.

2.1.1 Mortality

From Table 3.1, the numbers of homicide deaths increased significantly every 5 years from 1957 to 1984: from a low of 2,300 in 1957 to 3,107 in 1962, 5,185 in 1967 and fluctuated from a low of 4,654 in 1972, to a high of 12,476 in 1981, and back down to 7,345 in 1984. The homicide rate increased similarly, rising from a low of 9.4 per 100,000 population in 1957 to a high of 28.3 in 1975, and slightly decreased to 14.6 in 1984.

2.1.2 Distribution by sex, age, region, and month of occurrence

Between 1957-1984, 88.8% of homicide victims were male. This percentage remained virtually unchanged during this period. The homicide rate for males ranged from a low of 13.9 per 100,000 population in 1959 to a high of 52.3 in 1975 and back down to 25.5 in 1984. The rate in female also shows the same pattern, ranging from 2.0 in 1957 to 5.6 in 1980 and slowly declines to 3.6 in 1984. (Table 3.1).

Victims of homicides are usually young. In 1977 and 1984, 64% of homicide victims were between the ages of 15 and 39 while only 37% of Thais were in this age group. The age-specific homicide rate was highest in the age group of 45-49 years in 1984. (Table 3.2, Figure 3.2)

From 1980 to 1984, homicide rates were highest in the southern region, increasing from 38.9 per 100,000 population in 1977 to 58.9 in 1981 and slowly declining to 32.9 in 1984. The northeastern region had the lowest homicide rate every year. (Table 3.3)

In the same period, there appears to be a seasonal trend in the occurrence of homicide. The rate peaked in April and homicide were more likely to occur during January through May than during June through December. However, further investigation is needed to confirm the seasonal trend. (Figure 3.3)

Table 3.1 Number, rate (per 100,000 population) and percentage (of total deaths) of homicide and injury purposely inflicted by other persons by sex, Thailand, 1957-1984

Year	Total			Male			Female		
	Number	Rate	Percent	Number	Rate	Percent	Number	Rate	Percent
1957	2300	9.4	1.0	2055	16.8	1.7	245	2.0	0.2
1958	2920	11.7	1.3	2619	20.9	2.3	301	2.4	0.3
1959	2068	8.0	1.0	1795	13.9	1.6	273	2.1	0.3
1960	2307	8.7	1.0	2003	15.1	1.7	304	2.3	0.3
1961	2683	9.9	1.3	2367	17.5	2.0	316	2.3	0.3
1962	3107	11.2	1.4	2745	19.7	2.3	362	2.6	0.4
1963	3539	12.4	1.5	3147	22.1	2.5	392	2.7	0.4
1964	4193	14.4	1.8	3748	25.7	3.0	445	3.1	0.4
1965	4573	15.0	2.1	4048	26.8	3.4	525	3.3	0.5
1966	4555	14.7	1.9	3988	25.8	3.1	567	3.6	0.5
1967	5185	16.3	2.2	4606	29.0	3.6	579	3.6	0.6
1968	5428	16.5	2.3	4826	29.5	3.8	602	3.6	0.6
1969	5779	17.2	4.0	5151	30.7	3.9	628	3.7	0.6
1970	5285	14.5	4.0	4742	26.0	3.8	543	3.0	0.6
1971	5032	13.4	2.0	4475	23.8	3.5	557	3.0	0.6
1972	4654	12.1	1.9	4112	21.3	3.0	542	2.8	0.5
1973	6217	15.7	2.6	5466	27.6	4.1	751	3.8	0.9
1974	7479	18.5	3.0	6581	32.4	4.8	898	4.5	0.8
1975	11717	28.3	5.0	10880	52.3	8.2	837	4.1	0.8
1976	9589	22.6	4.0	8548	40.1	6.3	1041	4.9	1.0
1977	8502	19.5	3.6	7544	34.5	5.6	958	4.4	0.9
1978	10635	23.9	4.4	9435	42.2	6.8	1200	5.4	1.2
1979	11913	26.2	4.9	10663	46.7	7.6	1250	5.5	1.2
1980	11652	25.0	4.7	10349	44.3	7.2	1303	5.6	1.3
1981	12476	26.2	5.2	11250	47.1	8.0	1226	5.2	1.2
1982	10661	22.0	4.3	9505	39.0	6.6	1156	4.8	1.1
1983	8209	16.6	3.3	7283	29.3	5.0	896	3.8	0.9
1984	7354	14.6	3.3	6456	25.5	4.9	898	3.6	1.0

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1984

Table 3.2 Number and percent of homicide by age group and sex of victims, Thailand, 1977 and 1984

Age group	1977						1984					
	Total		Male		Female		Total		Male		Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
◀ 1	6	0.1	3	0.0	3	0.3	7	0.1	3	0.0	4	0.4
1-4	57	0.7	38	0.5	19	2.0	32	0.4	19	0.3	13	1.4
5-9	70	0.8	47	0.6	23	2.4	47	0.6	33	0.5	14	1.6
10-14	154	1.8	103	1.4	51	5.3	85	1.2	49	1.3	36	4.0
15-19	762	9.0	645	8.5	117	12.3	515	7.0	432	6.7	83	9.2
20-24	1397	16.4	1277	16.9	120	12.5	1072	14.6	963	14.9	109	12.1
25-29	1223	14.4	1121	14.9	102	10.7	1185	16.1	1072	16.6	113	12.6
30-34	992	11.6	896	11.9	96	10.0	1028	14.0	928	14.4	100	11.1
35-39	1058	12.5	967	12.8	91	9.5	816	11.1	721	11.2	95	10.6
40-44	847	9.9	770	10.2	77	8.0	749	10.2	673	10.4	76	8.5
45-49	672	7.9	605	8.0	67	7.0	672	9.1	607	9.4	65	7.2
50-54	422	5.0	358	4.7	64	6.7	460	1.3	396	6.1	64	7.1
55-59	295	3.5	262	3.5	33	3.4	245	3.3	209	3.2	36	4.0
60-64	140	1.6	118	1.6	22	2.3	133	1.8	107	1.7	26	2.9
65-69	90	1.1	75	1.0	15	1.6	78	1.0	61	0.9	17	1.9
70-74	53	0.6	44	0.6	9	0.9	45	0.6	30	0.5	15	1.7
75-79	31	0.4	23	0.3	8	0.8	29	0.4	19	0.3	10	1.1
80-84	19	0.2	16	0.2	3	0.3	14	0.2	9	0.1	5	0.6
85+	18	0.2	10	0.1	8	0.8	13	0.2	11	0.2	2	0.2
Age not stated	195	2.3	166	2.2	29	3.0	129	1.8	114	1.8	15	1.7
All ages	8501	100	7544	100	957	100	7354	100	6456	100	898	100

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1984

Figure 3.2 Homicide rate (per 100,000 population) by age and sex of victim, Thailand, 1984

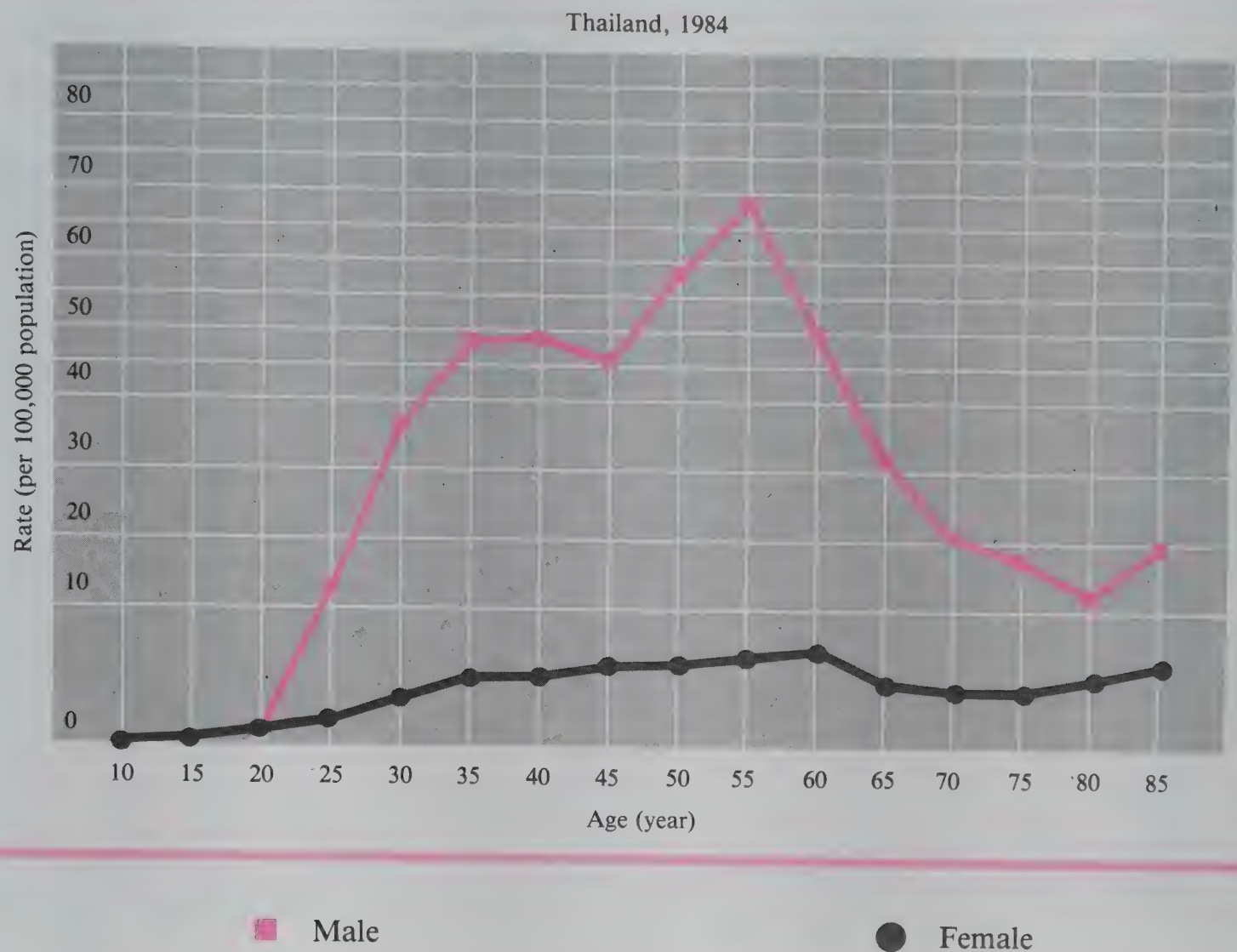
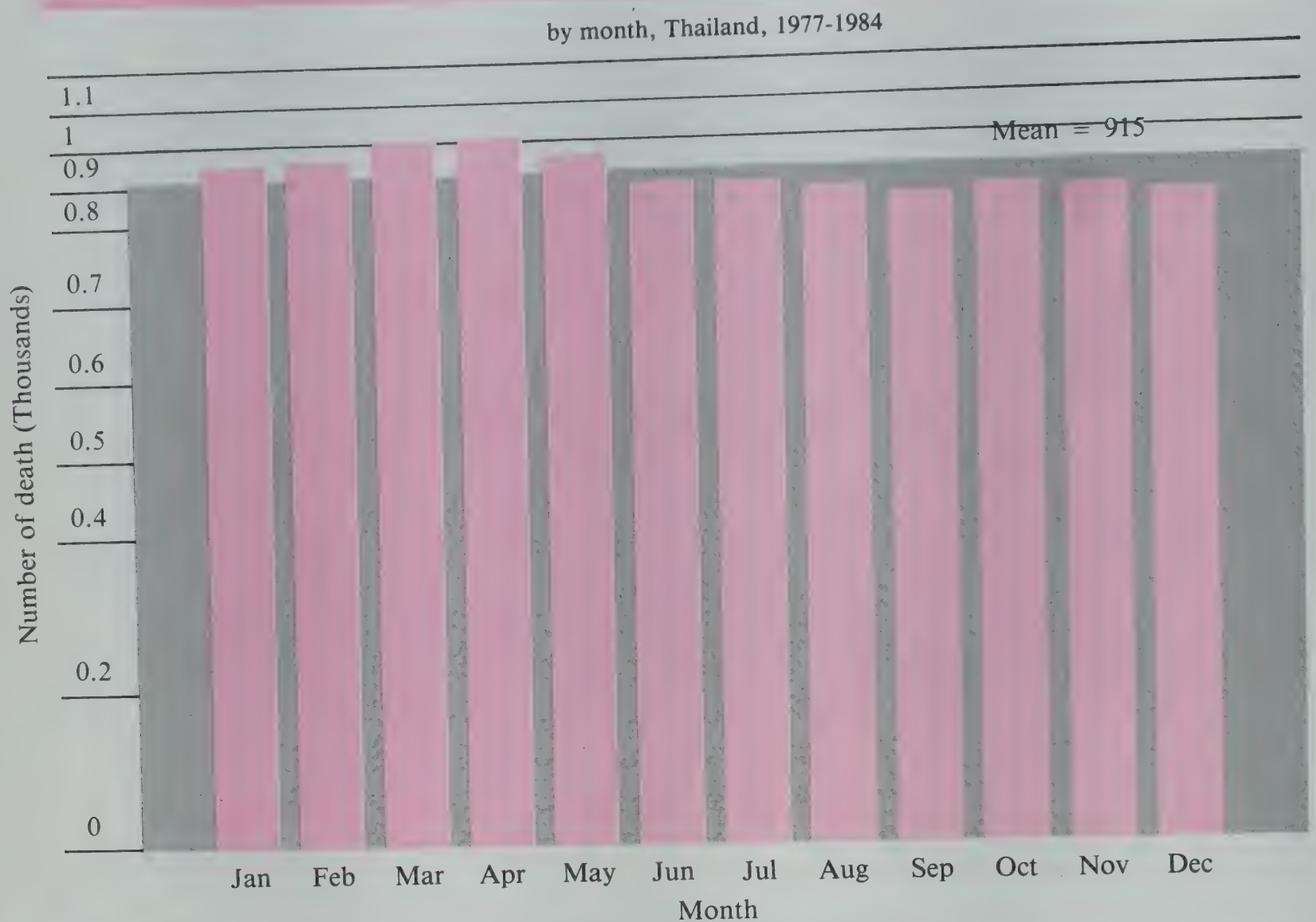


Table 3.3 Number and rate (per 100,000 population) of deaths from homicide and injury purposely inflicted by other persons by sex and regions, Thailand, 1980-1984

Region		1980		1981		1982		1983		1984	
		Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
All regions	T	11652	25.0	12477	26.2	10661	22.0	8209	16.6	7354	14.6
	M	10349	44.3	11251	47.1	9505	39.0	7283	29.3	6456	25.5
	F	1303	5.6	1226	5.2	1156	4.8	926	3.8	898	3.6
North	T	3218	33.3	3204	32.6	2648	26.4	2072	20.4	1742	16.9
	M	2865	58.7	2883	58.1	2359	46.8	1850	36.1	1525	29.4
	F	353	7.4	321	6.6	289	5.8	222	4.4	217	4.2
Northeast	T	1833	11.2	2086	12.4	1770	10.3	1252	7.2	987	5.5
	M	1641	20.0	1884	22.4	1574	18.3	1098	12.6	858	9.6
	F	192	2.3	202	2.4	196	2.3	154	1.8	129	1.4
Central (+ Bangkok)	T	3523	24.1	3722	24.9	3279	21.4	2604	16.6	2574	16.0
	M	3032	41.4	3288	43.8	2871	37.3	2252	28.5	2211	27.4
	F	491	6.7	434	5.8	408	5.3	352	4.5	363	4.6
South	T	3078	53.5	3465	58.9	2964	49.4	2281	37.3	2051	32.9
	M	2811	96.1	3196	106.9	2701	88.4	2083	66.9	1862	58.7
	F	267	9.4	269	9.3	263	8.9	198	6.6	189	6.2
Bangkok	T	719	14.0	751	14.0	650	11.7	624	10.9	641	10.8
	M	599	23.6	662	25.1	548	20.1	528	18.8	545	18.8
	F	120	4.6	89	3.3	102	3.6	96	3.3	96	3.2

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1984

Figure 3.3 5 year average number of homicide deaths by month, Thailand, 1977-1984



2.1.3 Means of Homicide

In 1984, 75% of homicide were committed with firearms, 17% from other and unspecified means and 8% from cutting or piercing instruments. These proportions did not change substantially from 1977, when 79 of homicides were committed with firearms. There was some variation by sex of the victims. In 1984 (similar to 1977), more men were killed by firearms than women (77% : 63%) and were less likely to be victims of other and unspecified means (16% : 27%) (Table 3.4)

2.1.4 Comparison of homicide with other causes of death

In terms of death rates, homicide was the second leading cause of death in 1980 and the fifth in 1983 (Table 2.16). However, when the impact of homicide on premature loss of life in Thailand is considered, total years lost in 1977 were 216,829 rising to 342,984 years in 1981 and declining to 195,227 years in 1984 (Table 3.5). When compared to total death, the proportionate mortality ratios of homicide death ranged from 3.2-5.2%.

Table 3.4 Number and percent of homicide by weapon and sex of victims, Thailand, 1977 and 1984

Means of homicide	Number						Percent					
	1977			1984			1977			1984		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Firearm and Explosive	6773	6110	663	5521	4959	562	79.7	81.0	69.2	75.1	76.8	62.6
Cutting and Piercing instrument	740	609	131	593	497	96	8.7	8.1	13.7	8.1	7.7	10.7
Other and unspecified	989	825	164	1240	1000	240	11.6	10.9	17.1	16.8	15.5	26.7
Total	8502	7544	958	7354	6456	898	100.0	100.0	100.0	100.0	100.0	100.0

Source : Division of Health Statistics, Ministry of Public Health, 1977, 1984

Table 3.5 Years of potential life lost of homicide by age group and sex, Thailand, 1977-1984

Age group	1977		1978		1979		1980		1981		1982		1983		1984	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-4	2327	1342	3306	2135	3648	3538	2950	2835	2596	2331	1829	1575	1416	1260	1298	1071
5-9	2444	1228	2964	1904	4004	2632	3618	2620	3132	2146	2268	1276	1782	1450	1782	812
10-14	4841	2601	5687	3825	5358	2193	5047	2915	3136	2703	4067	2862	3124	1166	2401	1908
15-19	27090	5382	33852	6900	39312	6578	38544	7920	36916	5808	30316	5328	24024	4080	19008	3984
20-24	47249	4920	62789	6765	70522	5822	71370	7524	78780	6235	59358	5203	44460	4773	37551	4687
25-29	35872	3672	46848	4392	51392	5184	55216	6080	61676	5320	52292	5548	42466	3914	36448	4294
30-34	24192	2976	30321	3534	35127	4092	39266	3465	44834	4851	38686	4950	28014	3960	26912	3300
35-39	21274	2366	24200	3094	27610	3094	27624	3500	30816	3472	25992	3220	19776	2800	17304	2660
40-44	13090	1617	16473	2289	18139	2751	20406	2392	22648	2507	18715	2691	13186	2047	12787	1748
45-49	7260	1072	9300	1760	10584	1536	12054	1782	13160	2142	11214	1530	8372	1224	8498	1170
50-54	2506	704	3171	539	3801	649	4563	1001	5355	806	4500	962	3402	585	3564	832
55-59	524	198	516	162	628	198	1164	328	1216	344	1220	264	1012	240	836	288
60-64	—	22	—	26	—	34	—	78	—	54	—	78	—	81	—	78
Total	188669	28160	239427	37325	270125	38301	281122	42431	304265	38719	250457	35487	191634	27580	168395	26832

2.2 Suicide

Suicide is categorized under E 950 - E 959 in ICD-9. Data in this report was mainly obtained from the death certificate from the Division of Health Statistics, Ministry of Public Health.

2.2.1 Mortality

There were 24,766 suicides reported by death certificates between 1977 and 1984. The number of suicide deaths increased from 2,578 deaths in 1977 to 3,456 in 1981 and declining to 3,023 in 1984. In addition, the suicide rate rose from 5.9 per 100,000 population in 1977 to 7.3 in 1981 and dropped down to 6.0 in 1984 (Table 3.6).

2.2.2 Distribution by age, sex, and region

The numbers and rates of suicide in males were slightly greater than females both in 1977 and 1984. Most cases were young. In 1977 and 1984, 63% of suicides were between the ages of 15 and 34. The age-specific suicide rates were lowest in the age of 10-14 years and highest in the age group of 20-24 years (Table 3.7 and 3.8).

From 1977 to 1984, suicide rates were highest in the northern region of Thailand, while lowest in the northeastern part. The highest incidence in the north increased from 8.5 in 1977 to 10.6 in 1983 and declined to 9.2 in 1984. The lowest rate was 2.9 in 1984 in the south (Figure 3.4).

2.2.3 Methods of suicide

The pattern of suicide by method varies greatly with sex. Both male and female patterns of suicide by methods were the same between 1977 and 1984 (Figure 3.5). In 1984 as in 1977, poisoning by liquid or solid substances was the most frequent method used by female (60.7 and 57.3), followed by hanging and strangulation. There was a slight difference between 1977 and 1984 in terms of the preference of methods of suicide for males. In 1977 poisoning by solid or liquid substances was the method most frequently used by male (39.7%), while in 1984 hanging and strangulation was the leading method (39.1%).

2.2.4 Premature loss of life

Although suicide is not high in the total population, its impact measured by the premature loss of life was quite high both in 1977 and 1984. Because the high risk group of suicide is the younger age group, the years of potential life lost from 2,578 suicide deaths were 78,112 years in 1977 and increased greatly to 93,565 years in 1984.

Table 3.6 Number and rate (per 100,000 population) of suicide, Thailand, 1977-1984

Year	Number	Rate
1977	2578	5.9
1978	2701	6.0
1979	3083	6.7
1980	3452	7.3
1981	3456	7.3
1982	3224	6.6
1983	3248	6.6
1984	3023	6.0

Source: Division of Health Statistics, Ministry of Public Health, 1977-1984

Table 3.7 Number and percent of suicide by age group and sex, Thailand, 1977 and 1984

Age group	1977						1984					
	Total		Male		Female		Total		Male		Female	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
10-14	95	3.7	45	33.0	50	4.2	94	3.1	40	2.3	54	4.2
15-19	572	22.2	211	15.3	361	30.2	544	18.0	200	11.6	344	26.5
20-24	570	22.1	281	20.3	289	24.1	670	22.2	356	20.7	314	24.5
25-29	300	11.6	162	11.7	138	11.5	433	14.3	251	14.6	182	14.0
30-34	186	7.2	114	8.2	72	6.0	256	8.5	157	9.1	99	7.6
35-39	185	7.2	112	8.1	73	6.1	186	6.2	129	7.5	57	4.4
40-44	147	5.7	104	7.5	43	3.6	173	5.7	121	7.0	52	4.0
45-49	162	6.3	98	7.1	64	5.3	164	5.4	109	6.3	55	4.2
50-54	103	4.0	75	5.4	28	2.3	144	4.8	113	6.6	31	2.4
55-59	66	2.6	51	3.7	15	1.3	115	3.8	82	4.8	33	2.5
60-64	63	2.4	50	3.6	13	1.1	76	2.5	56	3.3	20	1.5
65-69	41	1.6	29	2.1	12	1.0	50	1.7	38	2.2	12	0.9
70-74	25	0.9	15	1.1	10	0.8	38	1.3	27	1.6	11	0.8
75+	27	1.0	19	1.4	8	0.7	43	1.4	25	1.5	18	1.4
Age not stated	36	1.4	15	1.1	21	1.8	37	1.2	19	1.1	18	1.4
All ages	2578	100	1381	100	1197	100	3023	100	1723	100	1300	100

Source : Division of Health Statistics, Ministry of Public Health, 1977, 1984

Table 3.8 Suicide rate (per 100,000 population) by age group and sex, Thailand, 1977 and 1984

Age group	1977			1984		
	Total	Male	Female	Total	Male	Female
10-14	1.6	1.5	1.8	1.5	1.3	1.8
15-19	11.9	8.6	15.2	9.0	6.5	11.6
20-24	13.9	13.6	14.3	13.1	13.8	12.5
25-29	8.5	9.1	8.0	10.1	11.6	8.7
30-34	6.6	8.0	5.2	7.0	8.5	5.5
35-39	9.0	11.2	6.8	6.1	8.4	3.8
40-44	8.3	12.0	4.7	7.6	10.7	4.6
45-49	10.2	12.6	7.8	9.2	12.5	6.0
50-54	7.8	11.6	4.1	9.2	14.7	3.7
55-59	6.5	10.2	2.8	8.9	13.1	4.8
60-64	8.4	13.7	3.2	7.6	11.6	3.7
65-69	7.3	10.7	3.9	7.4	11.7	3.1
70-74	6.8	8.9	4.8	8.1	12.3	4.0
75+	8.2	12.8	3.7	10.0	13.2	6.8
All age	5.9	6.3	5.5	6.0	6.8	5.2

Source: Division of Health Statistics, Ministry of Public Health, 1977, 1984

Figure 3.4 Suicide rate (per 100,000 population) by region, Thailand, 1977-1984

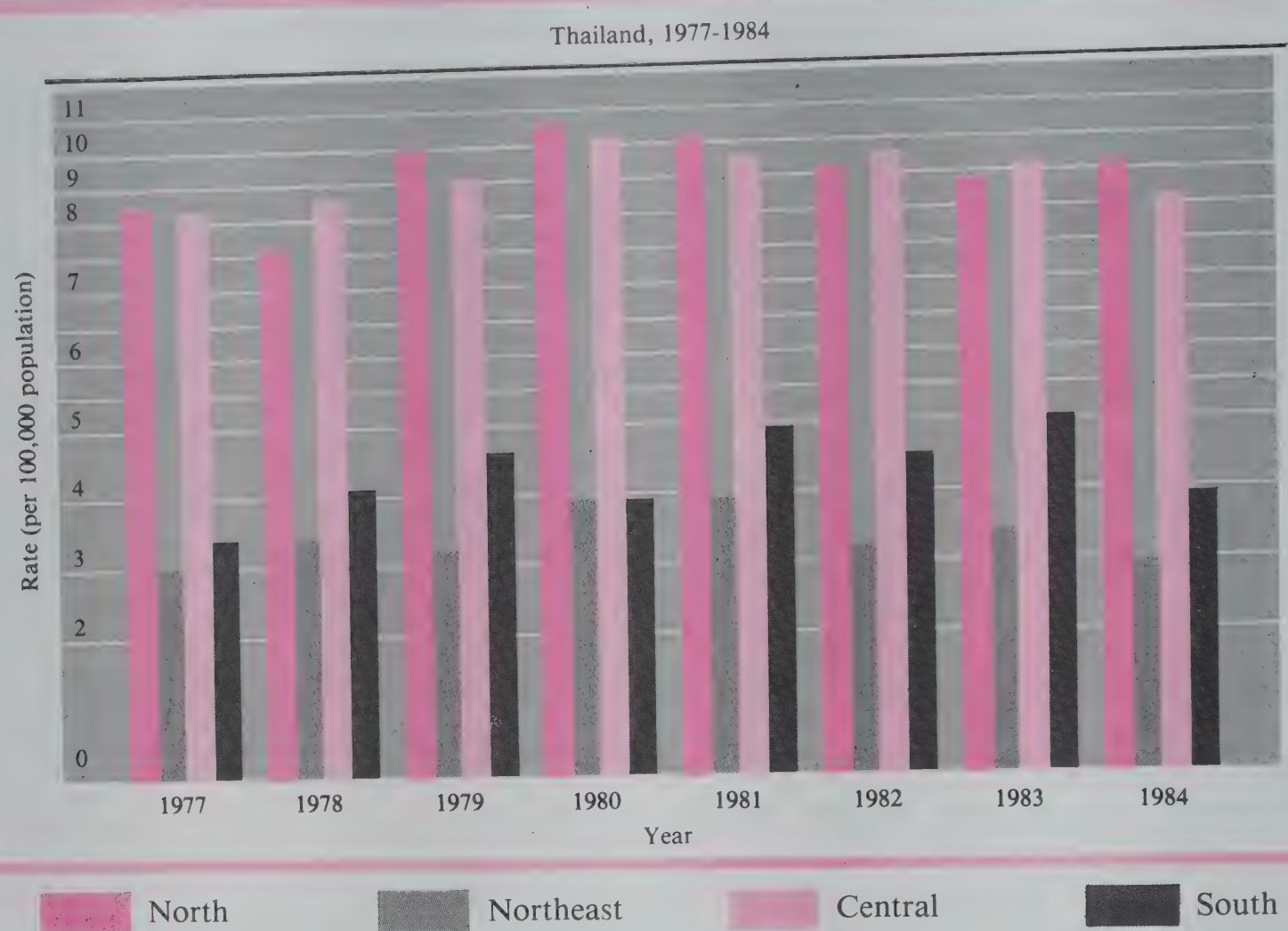
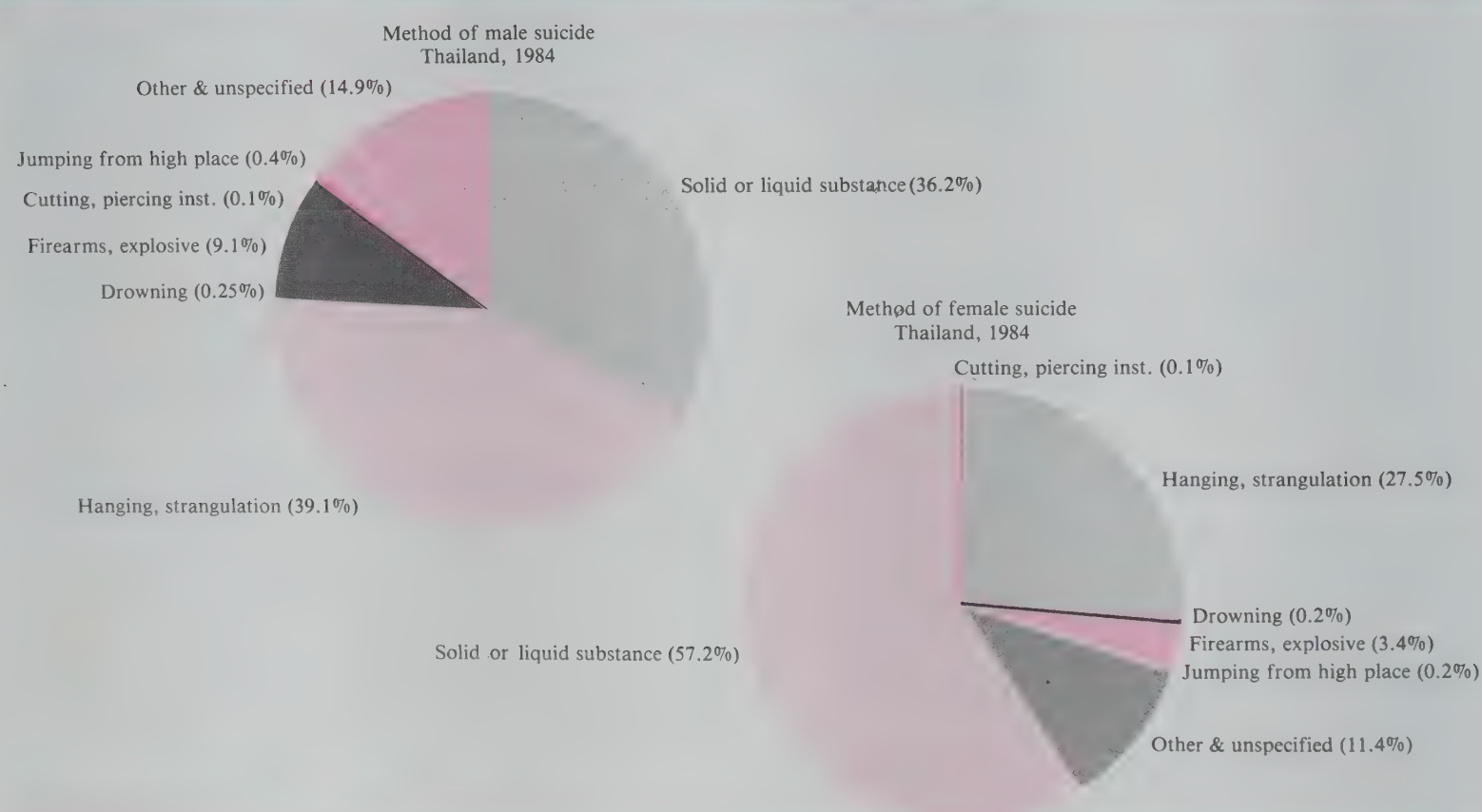


Figure 3.5 Methods of suicide by sex, Thailand, 1984



2.3 Traffic Accidents

2.3.1 Source of information

The information of traffic accident is obtained mainly from two sources: the Health Statistics Division, Ministry of Public Health and the National Safety Council of Thailand, Office of the Prime Minister.

2.3.2 Morbidity and mortality

In 1984, 5,655 people died from traffic accidents in Thailand. The number of deaths were equal to 2.5% of deaths from all causes. The mortality rate was 11.2 per 100,000 population (Table 3.9). After 1958 the trend of mortality increased until it peaked in 1978 after which, the rate has been decreasing (Figure 3.6).

Numbers of traffic accident cases can be collected only from inpatients; outpatient data are not available. In 1984, there were 90,006 cases which equals 3.5% of inpatients from all cases (Table 3.9). During the years 1981-1984, proportions of inpatients from traffic accidents are between 3.2-3.5%.

2.3.3 Distribution by time, place and sex

In 1984, 77% of deaths was males. This pattern was the same during 1980-1984 (Figure 3.7). The central region had the highest mortality rate of 17.7 per 100,000 population (Figure 3.8). The mortality rate by month is high from January to May, with the highest occurring in April (Figure 3.9).

2.3.4 Years of potential life lost and economic loss

Approximately 60% of deaths are in the age between 15-40 years old (Figure 3.10). The average age is 31.8, and total years of potential life lost are 176,490. Economic loss due to damage of vehicles during 1981-1984 is estimated to be 68.5 million baht annually.

Table 3.9 Inpatients and deaths from motor vehicle accidents, Thailand, 1981-1984

Year	Number	Inpatient Percent*	Death Number	Morbidity Rate (/100,000 pop.)	Mortality Rate (/100,000 vehicle)
1981	79009	3.5	6567	13.8	363.5
1982	74565	3.2	6355	13.1	270.5
1983	82106	3.5	6322	12.8	229.5
1984	90006	3.5	5655	11.2	187.0

Note: * Percentage of total inpatients

Source: Division of Health Statistics, Ministry of Public Health

Figure 3.6 Mortality rate (per 100,000 population) from traffic accidents, Thailand, 1957-1984

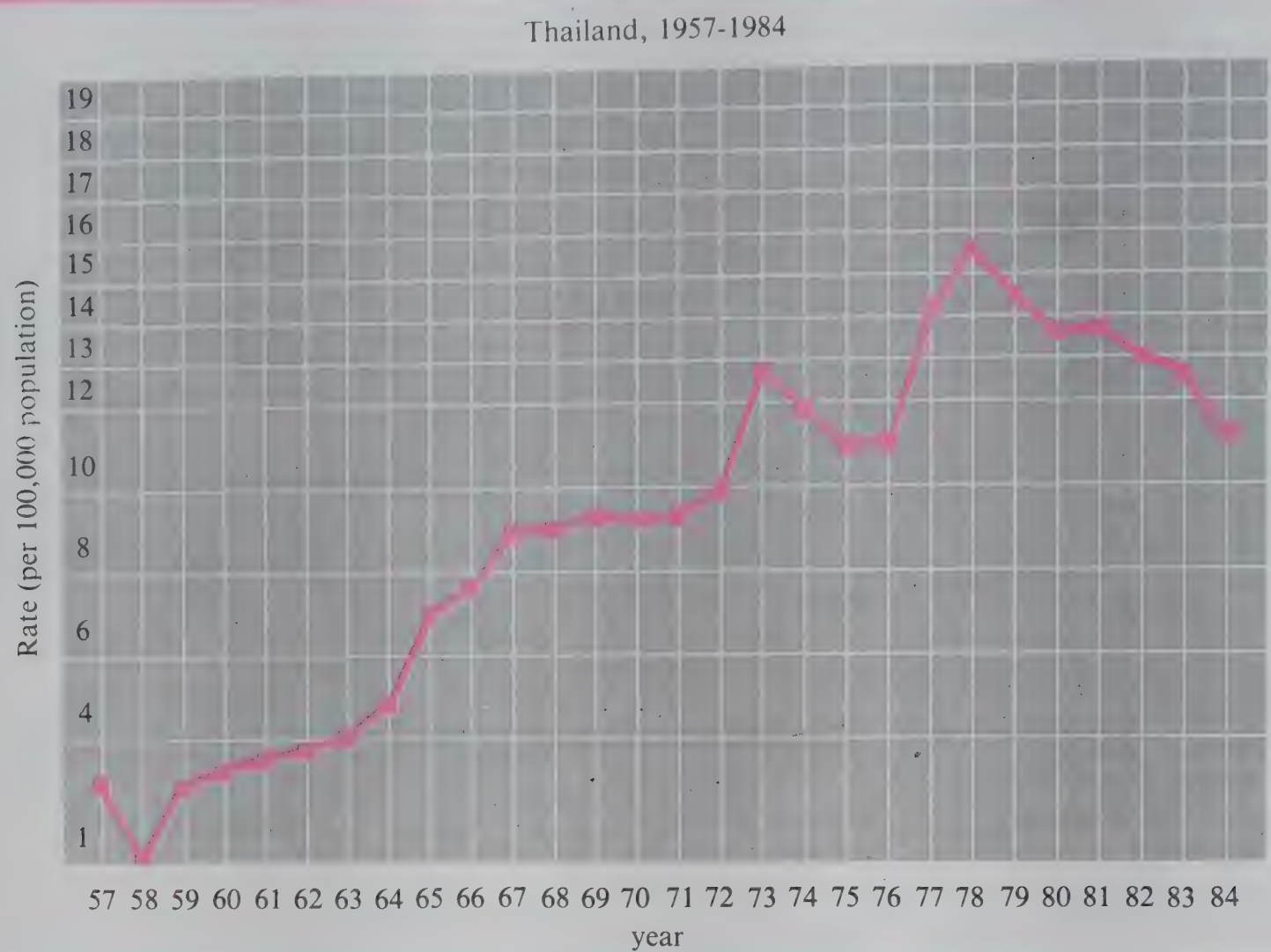


Figure 3.7 Death proportion of traffic accidents by sex, Thailand, 1980-1984



Figure 3.8 Death rate (per 100,000 population) from traffic accidents by regions, Thailand, 1983

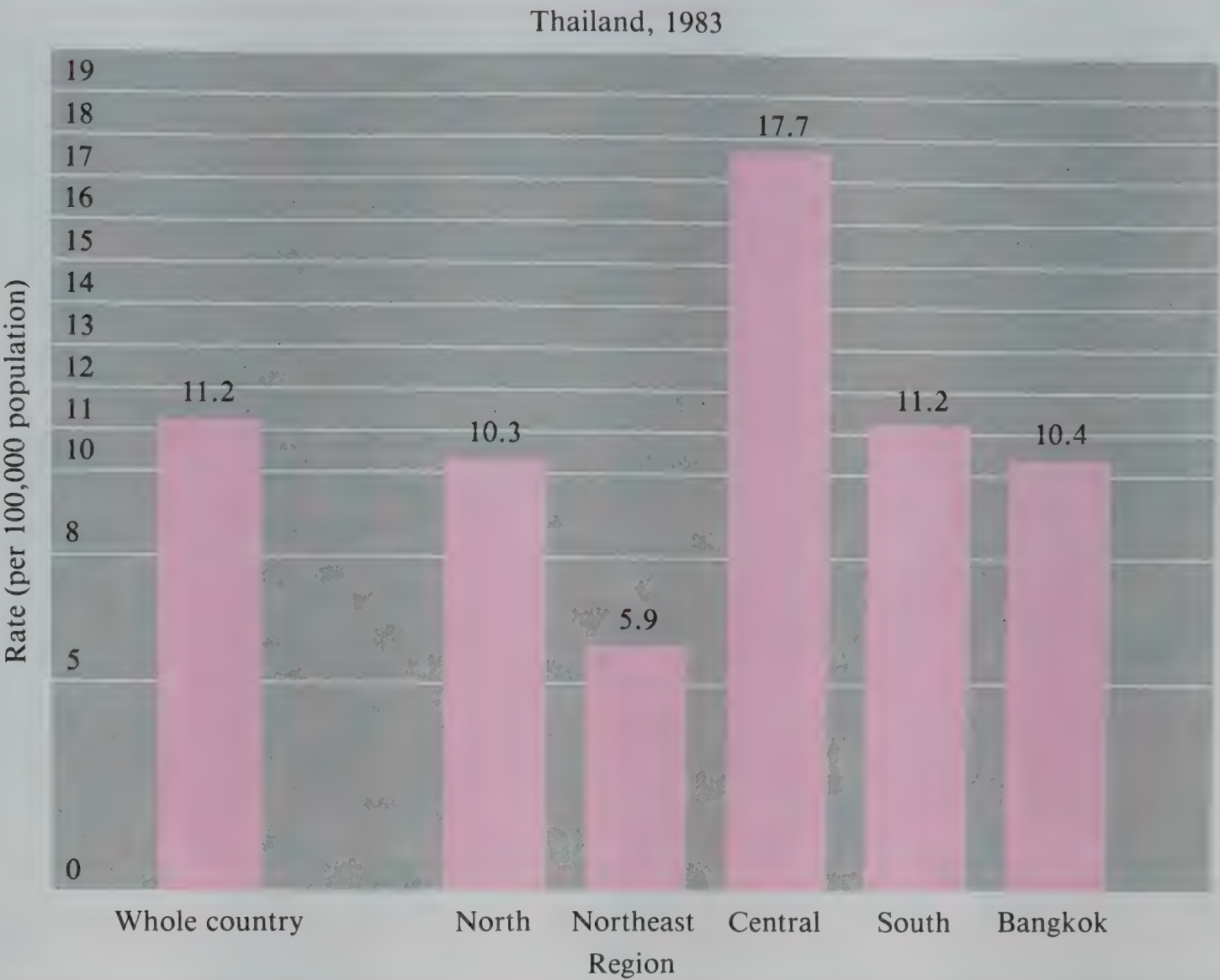
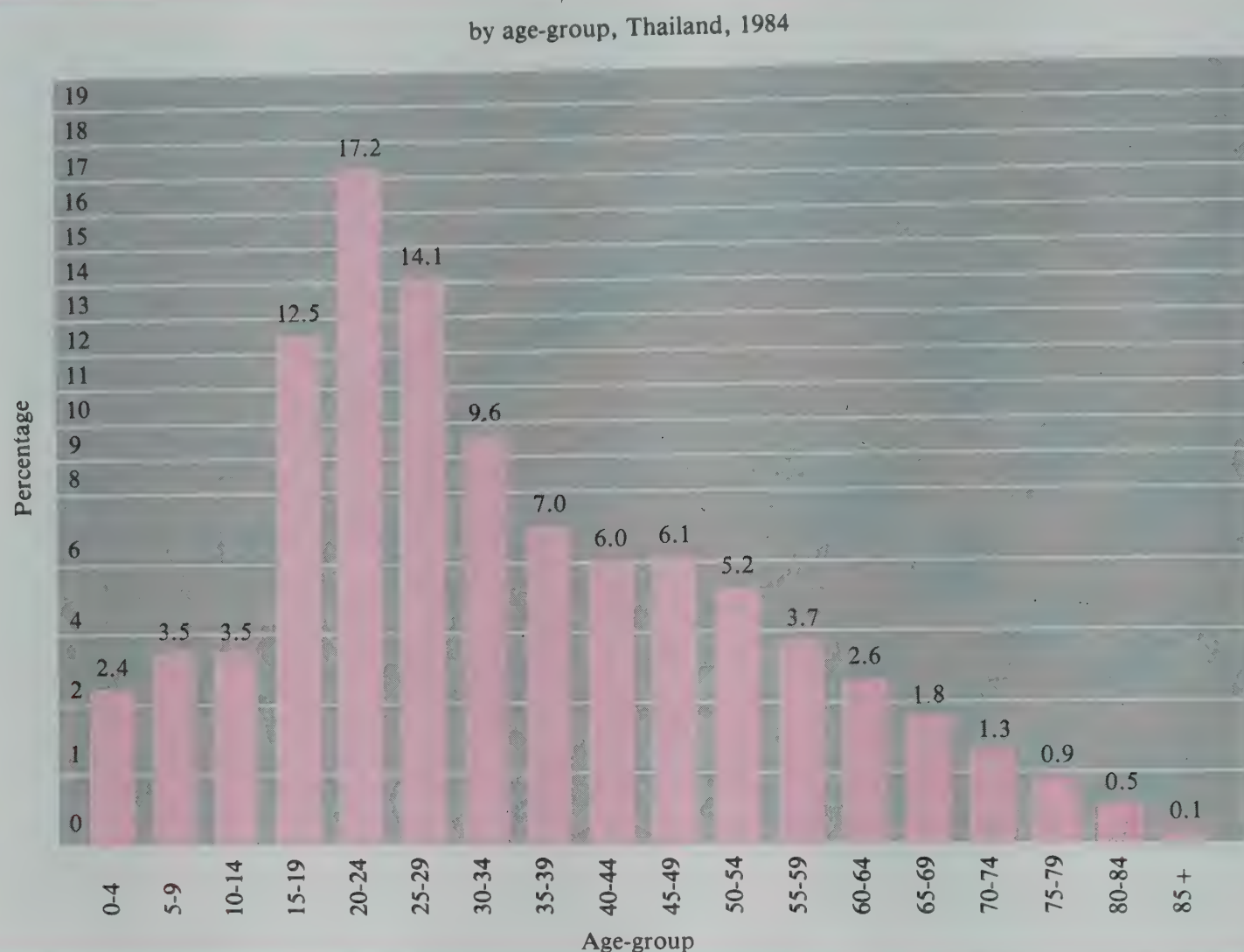


Figure 3.9 Death proportion of traffic accidents by month, Thailand, 1984



Figure 3.10 Death proportion of traffic accidents by age group, Thailand, 1984



2.4 Occupational Accidents

2.4.1 Source of information

The information in this section is obtained from the Office of the Compensatory Fund for Occupational Injuries, Ministry of Interior.

2.4.2 Morbidity and mortality

In 1984, there were 41,056 cases of occupational injuries and 444 deaths. The morbidity rate has been increased little by little from 56.8 per 100,000 population in 1980 to 81.2 per 100,000 population in 1984 (Table 3.10, Figure 3.11).

During 1983-1985, there were on the average 38,801 cases annually. Among these, 95.8% are temporary disability, 3.1% are partial disability, 0.10% are permanent disability, and 1.0% are fatal. Specific organ injuries are finger (23.7%), eye (15.2%), and foot (12.8%) (Figure 3.12).

2.4.3 Age group distribution

Nearly 90% of the cases are in the active period of life, 40% are 20-29 years old, 21% are 30-39 years old, 14.8% are 40-48 years old and 12.2% are between 16-19 years old (Figure 3.13).

2.4.4 Year of potential life lost and economic loss

Of 444 deaths in 1984, the mean age is 31.5 years old. Total years of potential life lost are 14,292. The Worker’s Compensation Fund Office spent 228.4 million baht for the care of injured workers. The total number of absent days due to the injuries is not available. If one includes the loss from absenteeism, it should be higher than this.

2.4.5 Other risk factors

Size of factory: Nearly half (48%) of the accidents from the three-year average (1983-1985) occurred in factories which have 100-500 workers (Figure 3.14). It should be noted that only factories which have over 20 workers are eligible for the compensatory fund. Hence, size of factory shown here does not represent the total.

Type of factory: Manufacturing has the highest proportion of accident (76.8%) especially in fabricated metal and food manufacturing (Table 3.11).

Table 3.10 Morbidity and mortality rate (per 100,000 population) from occupational accidents, Thailand, 1980-1984

Year	Morbidity		Mortality	
	Number	Rate	Number	Rate
1980	26386	56.8	416	0.9
1981	29347	61.3	455	0.9
1982	29989	61.4	411	0.8
1983	34928	70.5	346	0.7
1984	41056	81.2	444	0.8

Source: Office of Compensatory Fund, Ministry of Interior

Figure 3.11 Morbidity & mortality rate (per 100,000 population) from occupational accidents, 1980-1984



Figure 3.12 Occupational accidents by sites of body, Thailand, 1983-1984



Figure 3.13 Number of occupational injuries by age group, Thailand, 1984

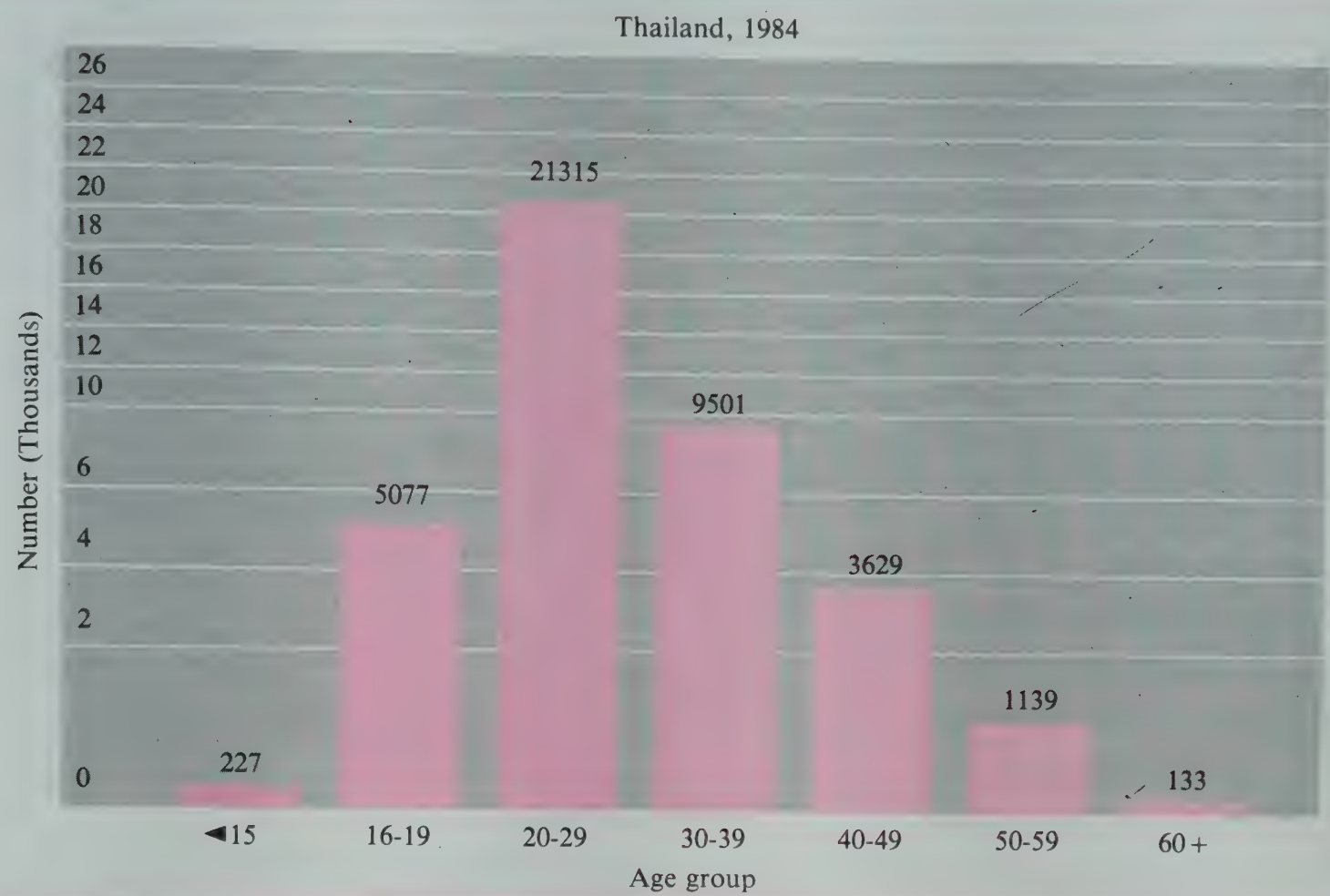


Figure 3.14 Occupational accidents by factory size, Thailand, 1983-1985

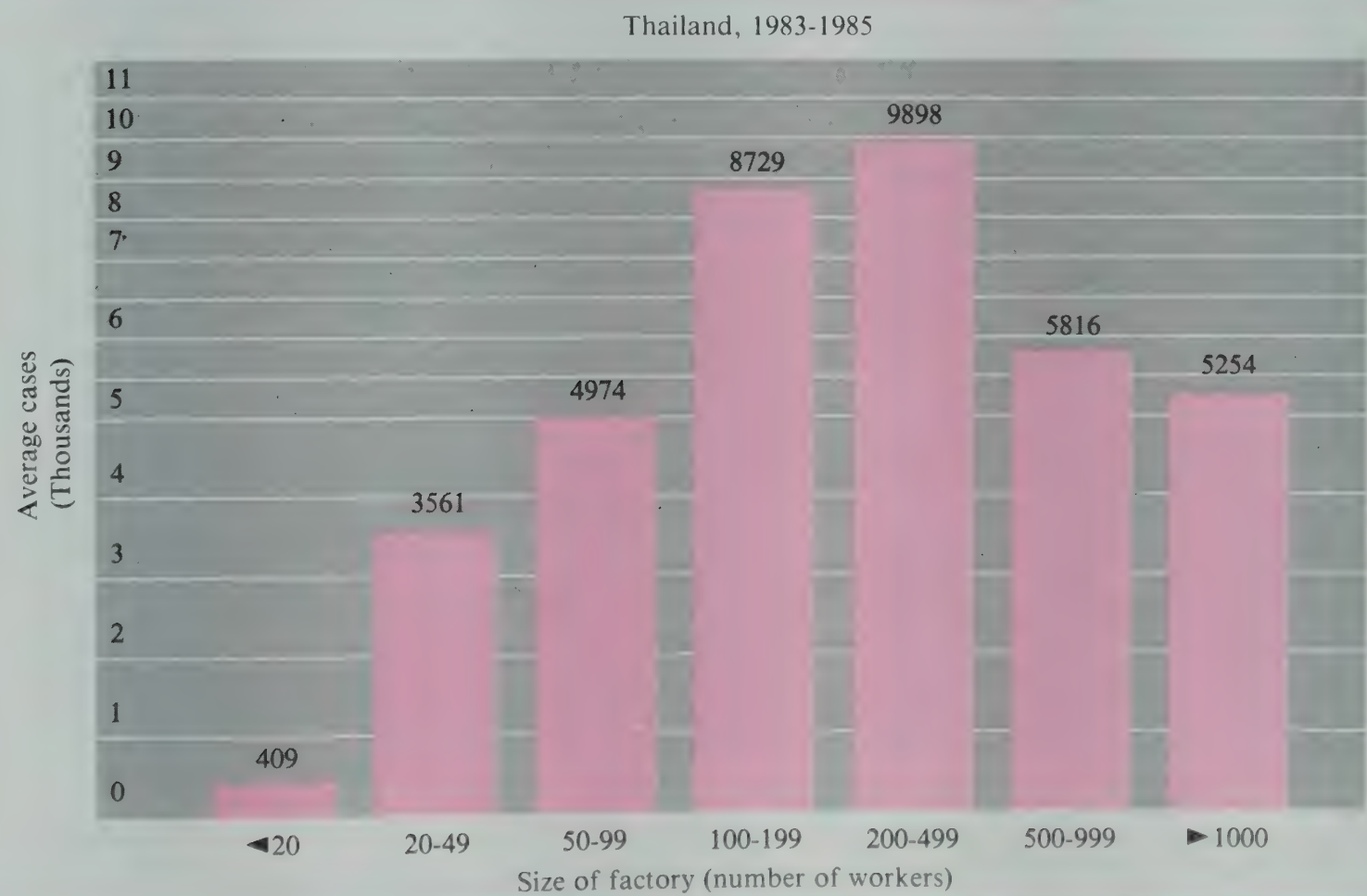


Table 3.11 Occupational accidents by industry, Thailand, 1983-1985 average

Industry	Case	
	Number	Percent
	66	0.17
Agriculture	594	1.53
Mining	29796	76.80
Manufacturing	7024	18.10
- Food	3958	10.20
- Textile	2695	6.95
- Wood	769	1.98
- Paper	2385	6.15
- Chemical	2220	5.72
- Non-metalic	2171	5.60
- Metalic	8484	21.87
- Fabricated metal	97	0.25
- Other	767	1.98
Electricity, gas, water	3638	9.38
Construction	1873	4.83
Trading	1135	2.93
Transport	931	2.40
Service	1	0.002
Unspecified		
Total	38801	100

Source: Office of Compensatory Fund, Ministry of Interior

3. MENTAL ILLNESS

Mental illness specified in this report is classified in the ICD-9 under 290-359 code. They are categorized to be psychoses (291-299), neuroses (300), personality disorders (301), alcohol and drug dependence (303-305), mental retardation (317-319), epilepsy (345), disorders of nervous system and others. Sources of data in this report are outpatient records from the Division of Health Statistics, outpatient and inpatient reports from the Department of Medical Services and the Division of Mental Health.

3.1 Outpatients

In 1983 and 1984, the rates of psychiatric illness attending the outpatient department of every hospital in the whole kingdom were 15.6 and 17.2 per 1,000 population. When compared to other non-communicable diseases, its morbidity rate is ranked eighth (Table 3.12). During 1979-1983, morbidity rates per 1,000 population for psychiatric illness were highest in the central and lowest in the northeastern region (Figure 3.15). The morbidity rates of mental illness are high in the provinces which have psychiatric hospitals or community mental health centers. In 1983, the highest rate was at Chainat province in the central region (7,120 per 100,000 population) and the lowest was at Sri Saket Province in the northeast (310 visits per 1,000 population) (Figure 3.16) (Division of Mental Health 1979-1983).

The Department of Medical Services started the Mental Health Program in 1977. Twelve neuro-psychiatric hospitals from every region are included in this program. Data from this program in fiscal year 1985 and 1986 showed that total numbers of outpatients increased from 589,482 to 606,144, of which 72% are psychiatric disorders and 2% are mental retardation (Table 3.13). However, new outpatient cases slightly decreased from 89,006 in 1985 to 83,780 in 1986. The ratio of outpatient to inpatient cases increased from 6:1 in 1977 to 8:1 in 1980 and slightly declined to 7:1 in 1984 (Figure 3.17).

Table 3.12 Number of outpatients with non-communicable diseases among the 13 causes groups according to Rep. No. 504 and rates (per 1,000 population), Thailand, 1983-1984

Rank	Cause	1983		1984	
		Number	Rate	Number	Rate
1	Respiratory system	4830097	110.5	5880594	132.2
2	Digestive system	2902810	66.4	3372091	75.8
3	Accidents, poisoning, violence	1770270	40.5	1974752	44.4
4	Skin and subcutaneous tissue	1271600	29.1	1431542	32.2
5	Nervous system and sense organs	875885	20.0	1083536	24.4
6	Genitourinary system	834502	19.1	986397	22.2
7	Musculoskeletal system and connective tissue	820688	18.8	1029016	23.1
8	Mental disorder	680917	15.8	766772	16.7
9	Endocrine, nutritional and metabolic diseases	552621	12.6	644441	14.5
10	Circulatory system	548650	12.5	647886	14.6
11	Blood and blood forming organs	210391	4.8	226465	5.1
12	Neoplasms	91327	2.1	115255	2.6
13	Congenital anomalies	14460	0.3	11561	0.3

Source : Chitanondh H, Noncommunicable Diseases in Thailand, 1986

Figure 3.15 Outpatients of psychiatric illness by region, Thailand, 1981

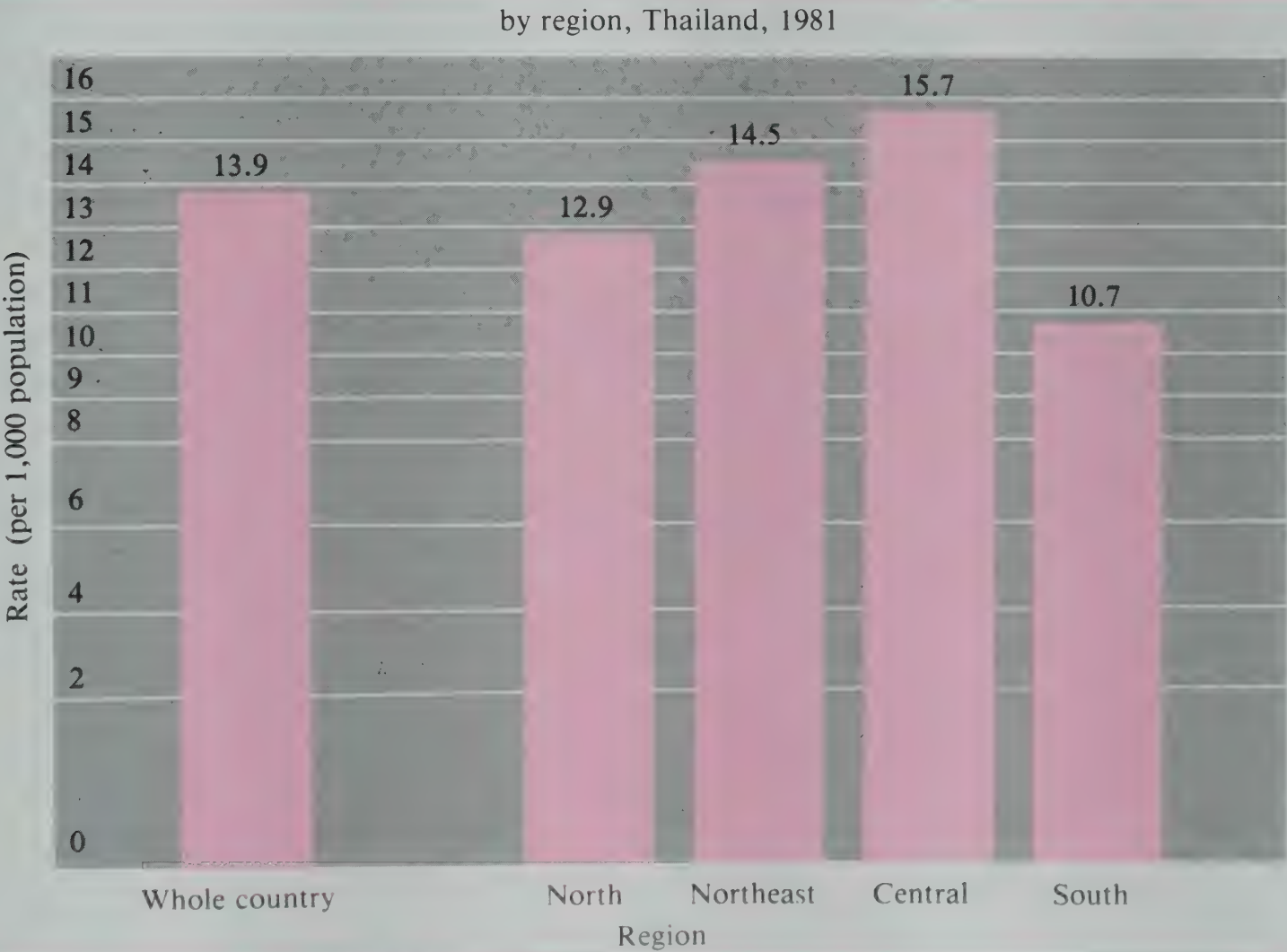


Figure 3.16 Rate (per 100,000 population) of mental illness by provinces, Thailand, 1983

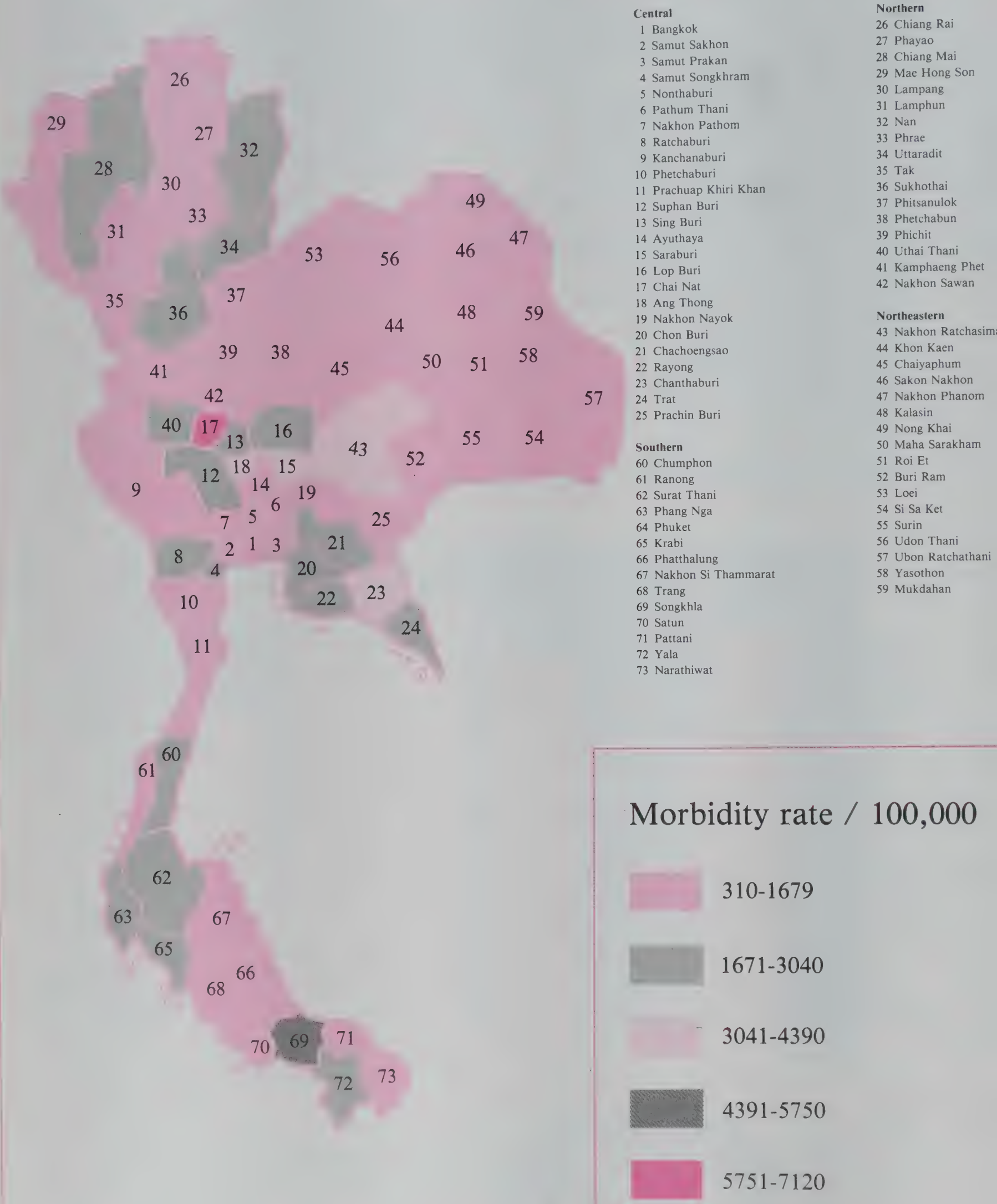


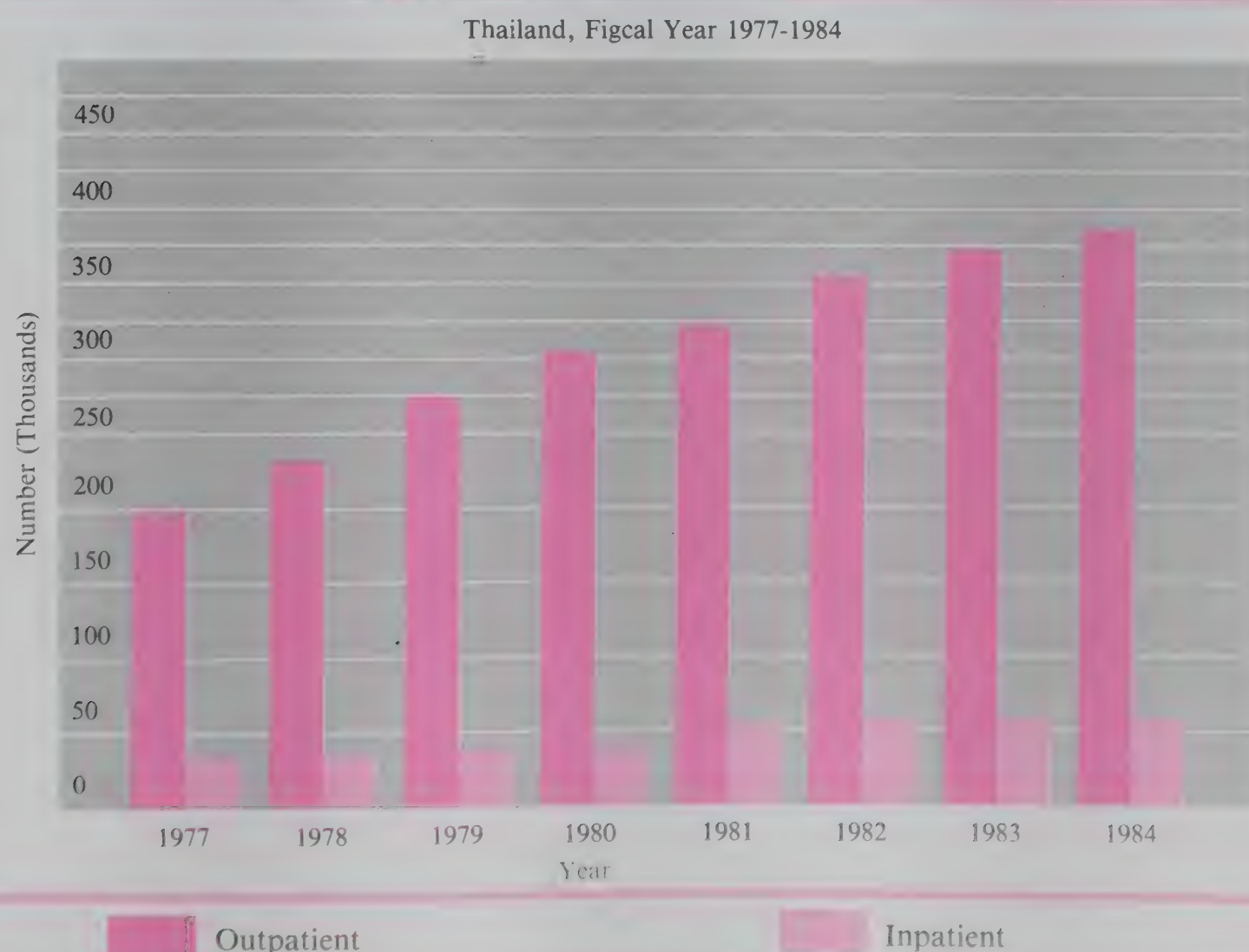
Table 3.13. Number and percent of outpatients by groups of diseases and region, fiscal year 1985, 1986 (October 1984-October 1986)

Region	Total		Psychiatric disease		1985		Mental retardation		Others	
					Neurologic disease					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Bangkok	125463	100	65389	52.1	23402	18.7	9762	7.8	26910	21.4
Central	132188	100	99782	75.5	3078	2.3	331	0.3	28997	21.9
Northeast	197104	100	150443	76.3	30333	15.4	773	0.4	15555	8.3
North	58315	100	47958	82.2	2416	4.1	361	0.6	7580	13.0
Southern	76412	100	54335	71.1	5119	6.7	149	0.2	16809	22.0
Total	589482	100	417907	70.9	64348	10.9	11376	1.9	95851	16.3

Region	Total		Psychiatric disease		1986		Mental retardation		Others	
					Neurologic disease					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Bangkok	129466	100	71621	55.3	24255	18.7	10198	7.9	23392	18.1
Central	134405	100	106385	79.2	3631	2.7	252	0.2	24137	18.0
Northeast	201136	100	158628	78.9	23449	11.7	1022	0.5	18037	9.0
North	64848	100	51573	79.5	4003	6.2	407	0.6	8865	13.7
Southern	76289	100	52000	68.2	7084	9.3	168	0.2	17037	22.3
Total	606144	100	440207	72.6	62422	10.3	12047	2.0	91468	15.1

Source: Mental Health Program, Department of Medical Services, 1985-1986

Figure 3.17 Number of outpatients and inpatients, Thailand, fiscal year 1977-1984



3.2 Inpatients

In 1983 and 1984, the number of mental illness inpatients per 1,000 admissions slightly decreased from 15 to 13. The sex ratio of males to females in 1981 appeared to be 1:0.86. The highest numbers of inpatients per 1,000 admissions was in the central (30.0) where the lowest was in the north and the northeast (Figure 3.18). Professionals and administrators had the highest rates per 1,000 admissions (67.2) and the lowest was housewife and the unemployed (Figure 3.19).

The first leading cause of admission is schizophrenic psychoses (60%) which is followed by other psychoses (16.8%) and neurotic and personality disorders (5.7%) (Figure 3.20). Males have higher numbers of admissions for all types of diseases except affective psychoses, paranoid states and neurotic disorder. The number of male schizophrenic patient is twice as many as female (Table 3.14). The highest case-fatality ratio among these are senile and presenile organic psychotic conditions and cerebral infarction (3.3%). The average length of stay in the hospital was 69.2 days per case.

The Division of Mental Health, Department of Medical Services, performed a point prevalence survey in 12 hospitals under the Mental Health Program from the fiscal years 1982 to 1986. In the fiscal year of 1986, 6,341 cases of psychiatric illness were admitted. Half of the cases were in the age group of 20-39 years old (Table 3.15). By ICD-9 classification, 50% were admitted with schizophrenic psychoses. Seventy-eight percent of mental retardation cases were admitted before 25 years of age while most schizophrenic cases were adolescents and adults (25-59 years) (Table 3.16). About 50% of psychiatric illnesses were not hospitalized longer than one year and about 25% stayed longer than 5 years. In 1986, only 23.4% were discharged from the hospitals with a complete recovery rate of 1.2%.

Figure 3.18 Inpatients of mental health and drug dependence by region,Thailand, 1981

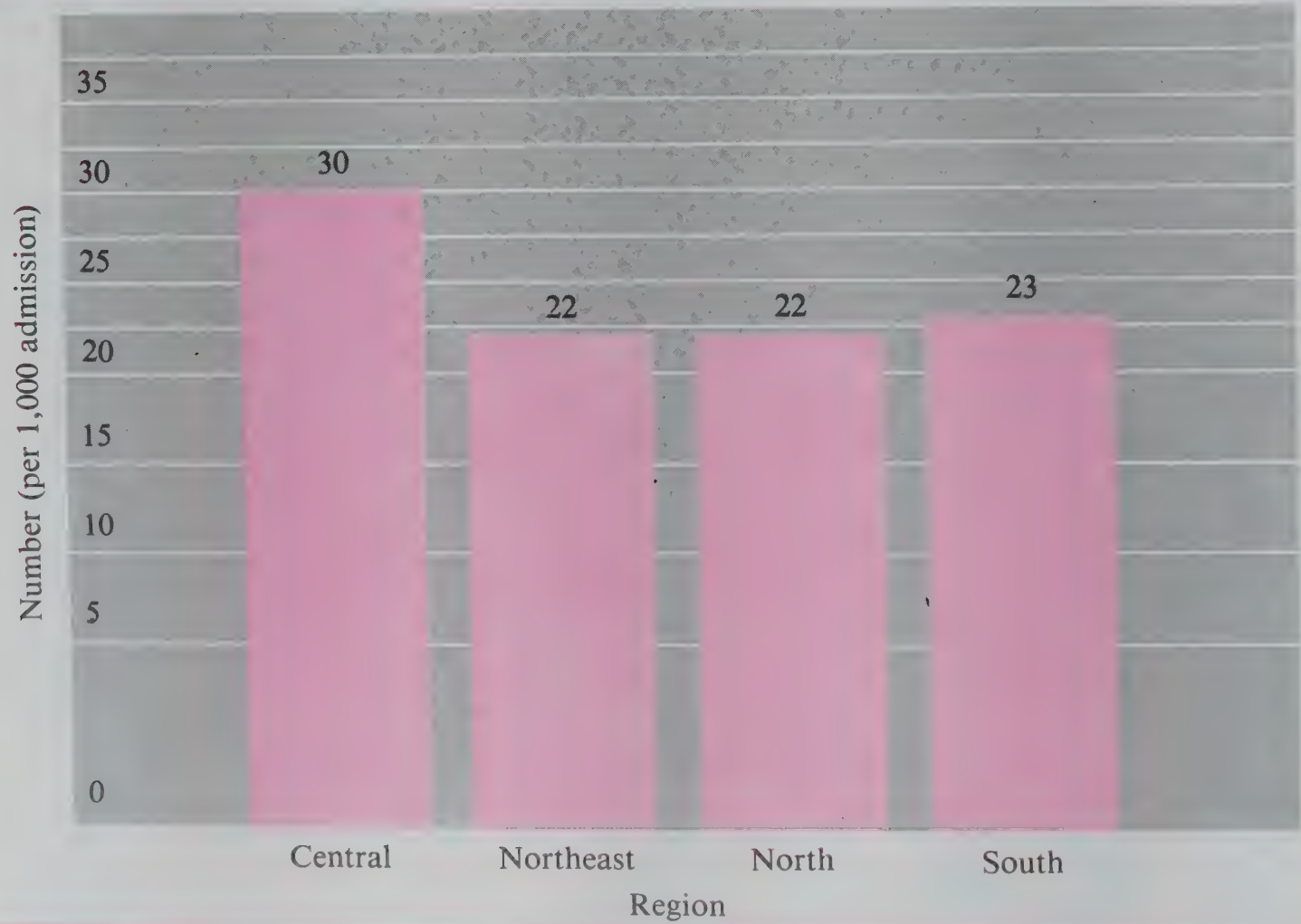


Figure 3.19 Rate (per 1,000 admission) of mental disorder by occupation, Thailand, 1981

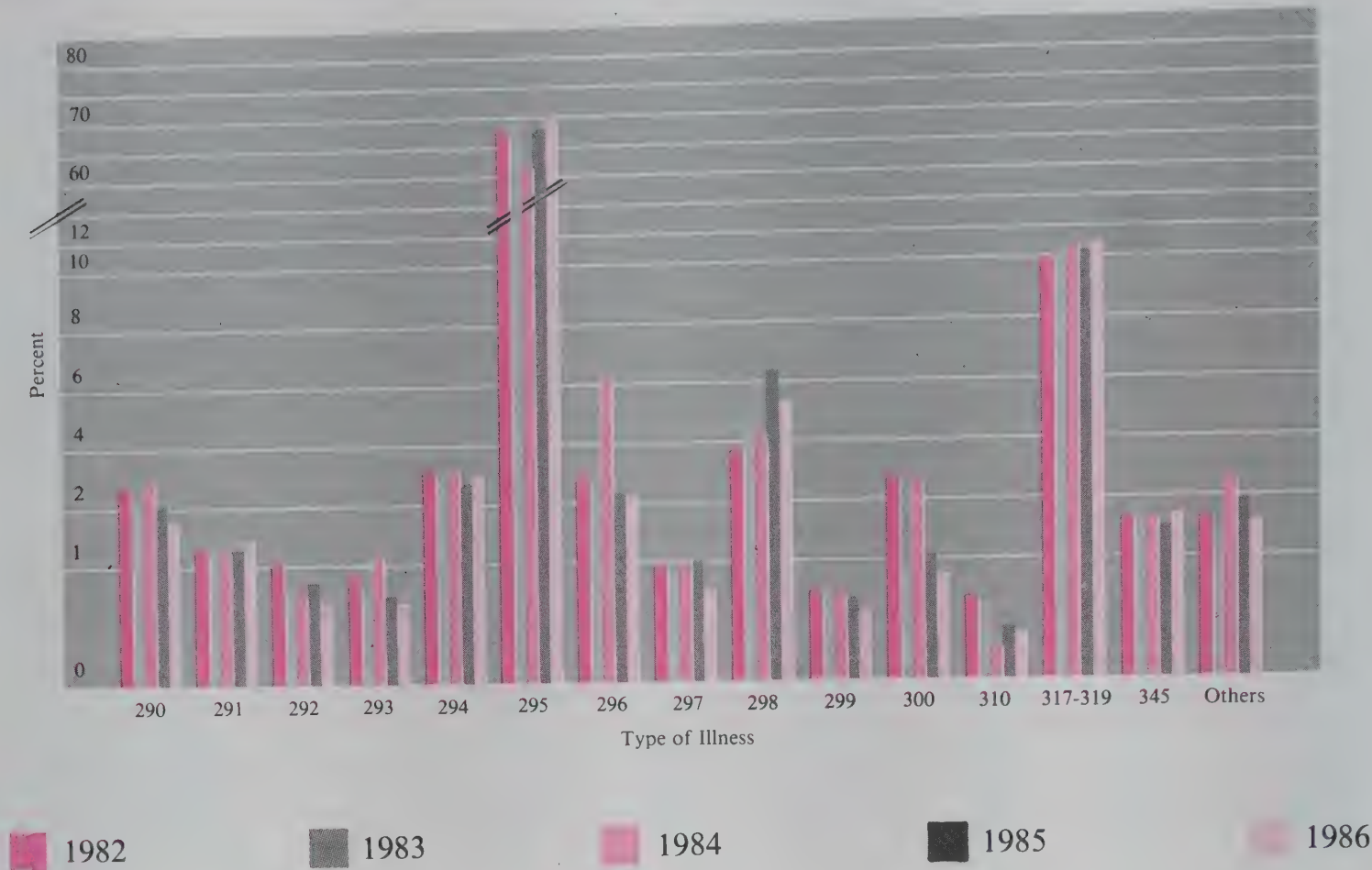


Table 3.14 Number and percent of inpatients of psychiatric disorder classification by ICD-9 by sex, Thailand, 1986

Classification	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
Senile and presenile organic psychoses	110	2.5	40	1.4	70	4.5
Alcoholic psychoses	90	2.1	81	2.9	9	0.6
Drug psychoses	44	1.0	42	1.5	2	0.1
Transient organic psychoses	42	1.0	25	0.9	17	1.1
Other organic psychoses	183	4.2	118	4.2	65	4.2
Schizophrenic psychoses	2243	51.7	1530	55.0	713	45.7
Affective psychoses	137	3.2	61	2.2	76	4.9
Paranoid psychoses	49	1.1	20	0.7	29	1.9
Other nonorganic psychoses	339	7.8	173	6.2	166	10.6
Psychoses with origin specific to childhood	35	0.8	28	1.0	7	0.4
Neurotic disorder	56	1.3	18	0.6	38	2.4
Mental retardation	688	15.8	445	16.0	243	15.6
Others	325	7.5	199	7.2	126	8.1
Total	4341	100.0	2780	100.0	1561	100.0

Source : Division of Mental Health, Department of Medical Services, 1986

Figure 3.20 Percentage of inpatients in psychiatric hospitals by type of illness, Thailand, 1982-1986



290 Senile and presenile organic psychoses
291 Alcoholic psychoses
292 Drug psychoses
293 Transient organic psychoses
294 Other organic psychoses
295 Schizophrenia
296 Affective psychoses

297 Paranoid states
298 Other non-organic psychoses
299 Psychoses with origin specific to childhood
300 Neurotic disorder
310 Specific non-psychoses mental disorder
317-319 Mental retardation
345 Epilepsy

Table 3.15 Number and percent of psychiatric inpatient by age group and sex , Thailand, 1986

Age group	Male		Female		Total	
	Number	Percent	Number	Percent	Number	Percent
0-4	9	0.2	7	0.3	16	0.3
5-9	66	1.7	33	1.3	99	1.6
10-14	141	3.7	99	3.9	240	3.8
15-19	306	8.1	169	6.6	475	7.5
20-24	498	13.2	212	8.3	710	11.2
25-29	621	16.4	318	12.4	939	14.8
30-34	517	13.7	339	13.2	856	13.5
35-39	402	10.6	282	11.0	684	10.8
40-44	266	7.0	211	8.2	477	7.5
45-49	275	7.3	216	8.4	491	7.7
50-59	374	9.9	399	15.6	773	12.2
60-75	256	6.8	234	9.2	490	7.7
75 +	49	1.3	42	1.6	91	1.4
Total	3780	100.0	2561	100.0	6341	100.0

Source : Division of Mental Health, Department of Medical Services, Ministry of Public Health, Point Prevalence Survey in September 1986

Table 3.16 Number and percent of inpatients of selected psychiatric illness by age group, fiscal year 1984

Diagnoses	Total Case	0-4		15-24		25-59		60 +	
		No.	%	No.	%	No.	%	No.	%
Schizophrenic psychoses	3890	9	0.2	674	17.3	2890	74.3	317	8.2
Affective psychoses	393	1	0.3	16	4.1	328	83.5	48	12.2
Mental retardation	628	282	41.4	251	36.8	145	21.3	4	0.6
Neurotic disorder	166	-	-	4	2.4	143	86.1	19	11.4

Source : Division of Mental Health, Department of Medical Services, Ministry of Public Health, Point Prevalence Survey in September 1986

3.3 State of Mental Health Research

In 1987, the social workers from Somdet Chao Praya Psychiatric Hospital performed a field survey at Klong San district, Bangkok. Four hundred and ten households were randomly selected and 2,670 residents were interviewed. They found that the rate of psychotic illness was 4.87 per 1,000 population. The most common symptoms were delusion and hallucination (53.8%) and communication difficulty (23.1%); 69% had been treated in the psychiatric hospital. Dr. Pirom Sukonthapirom Na Pattalung and her colleagues (1986) also conducted a mail survey to 1,072 households randomly selected from 24 districts in Bangkok and achieved a response rate of 53.2%. It was found that 1.23% had a history of mental retardation, 0.60% organic psychoses, 1.9% schizophrenic psychoses, 5.4% affective disorders with 0.46% attempted suicide and 10.7% anxiety neuroses.

A total of 2,144 mental retards were reviewed from registration charts from 6 institutes in Bangkok, with 1,219 males and 925 females. Over 15% were caused from infections which could be controlled by public health intervention, 11.1% from trauma and physical agents, 9.5% from Down's syndrome and 1.6% from intoxication (Komkris et al 1982).

In 1984, Jaisin, Choprapawon and others, conducted a mental health survey in Chonburi province by using the "Health Opinion Survey" (HOS) questionnaire to determine recent history of stress-related symptoms and the "Symptom Check List-90" questionnaire to classify the mental illness. A total of 4,114 respondents from 1,217 randomly selected households in 69 villages in 11 districts were interviewed by using the HOS and 360 respondents (obtained by systematic sampling from the first stage) were interviewed using SCL-90. It was found that approximately 30% of all respondents (CI 27.25-30.02) had mental problems with 8 (0.2%) cases of significant psychiatric illness (4 cases of mental retardation, 2 cases of organic brain syndrome, 1 case of chronic alcoholism and 1 case of severe depressive illness). This study showed that one who had a high stress score had more psychiatric symptoms. The most common symptoms were somatization (26.4%), depression (15.5%), phobia (14.6%) and psychosis (8.8%). The respondents in the age group of 25-34 years typically exhibited somatization, anxiety, hostility, phobia and paranoia, while those in the 45-54 age group experienced obsessive-compulsiveness, inter-relationship problems and depression. Psychotic illness was commonly found in adolescents (15-25 years) and females had a higher rate of mental illness than males. (Jaisin P, Choprapawon C, 1984)

Dr. Bunlu Siripanich and his colleagues conducted the National Survey of Disabled Persons and Elderly in Thailand in 1982. The rate of psychoses per 100,000 population was 79.3; it was higher in Bangkok at 86.4. Males had a higher rate than females at the ratio of 1.3:1. Sixty percent of cases were adults aged 25-60 years old. Most of the cases (82%) were dependents of relatives. Mental retardation was found at the rate of 161.9 per 100,000 population and was 533.2 in Bangkok. Male rates were higher than female rates (1.45:1) and the highest rate was found in children and teenagers (7-24 years). 75% was retarded at birth, 13% was due to illness.

3.4 Epidemiology of Mental Illness

More data are critically needed. Mental illness and mental health cannot be adequately assessed by the current existing data. Despite the obvious importance of mental health as a public health problem, information to permit the study of the epidemiology of mental illness is not available. The basic information of time, place, and persons are lacking as to the numbers and characteristics of the risk population and the factors that influence mental health in normal lives.

4. DRUG ADDICTION

4.1 Source of Information

The information below was collected by the Office of Narcotic Suppression in 1985 from 95 hospitals which gave medical care for drug addiction cases over the whole Kingdom of Thailand.

4.2 Morbidity and Mortality

There were 52,593 reported cases of drug addiction in 1985. Since 1981, the annual number of drug addiction cases has been increased from 53.7 per 100,000 population to 102.4 in 1985. The trend of this problem increases constantly (Figure 3.21). It is suspected that the actual number of cases might be many times greater than the reported cases, although the exact number is unknown. Data on mortality due to drug addiction are not available.

4.3 Distribution by Age, Sex and Region

Fifty seven percent of cases are 21-30 years old and 23% are 31-40 years old (Figure 3.22). Nearly 95% are male. Eighty five percent (44,725) of reported cases are heroin addicts, 9% are opium addicts and nearly 2% are marijuana users.

Since most cases are heroin addicts, the distribution here showed only those cases: 58.7% of cases live in Bangkok, 24.8% live in central region outside Bangkok. The northeastern region has the fewest cases, only 1.4% (Figure 3.23).

4.4 Economic Loss

By asking the cases who came to receive treatment, it was found that each case spent an average 39,777 baht per year. The amount of money used to buy drugs for the reported cases in 1985 was estimated to be approximately 2,092 million baht.

4.5 Reasons for First Time Drug Use

Forty -nine percent stated that they wanted to try a new experience, 20% was persuaded by friends, 13% used drugs to relieve unhappiness and 9% wanted to be accepted by their peer group. Only 4% used drugs to relieve a physically painful condition.

Figure 3.21 Rate of drug addiction, Thailand, 1980-1985

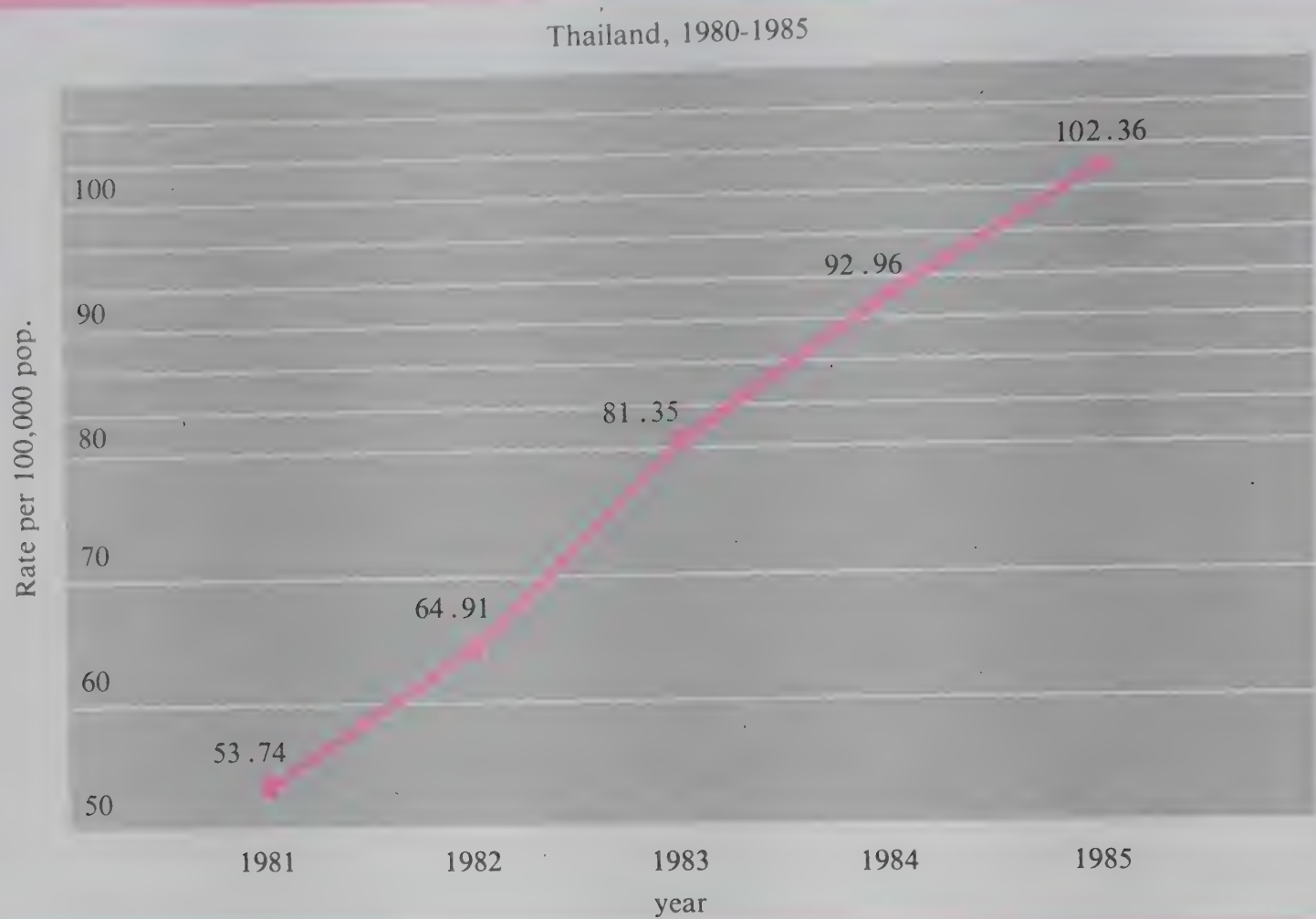


Figure 3.22 Proportion of drug addiction by age group, Thailand, 1985

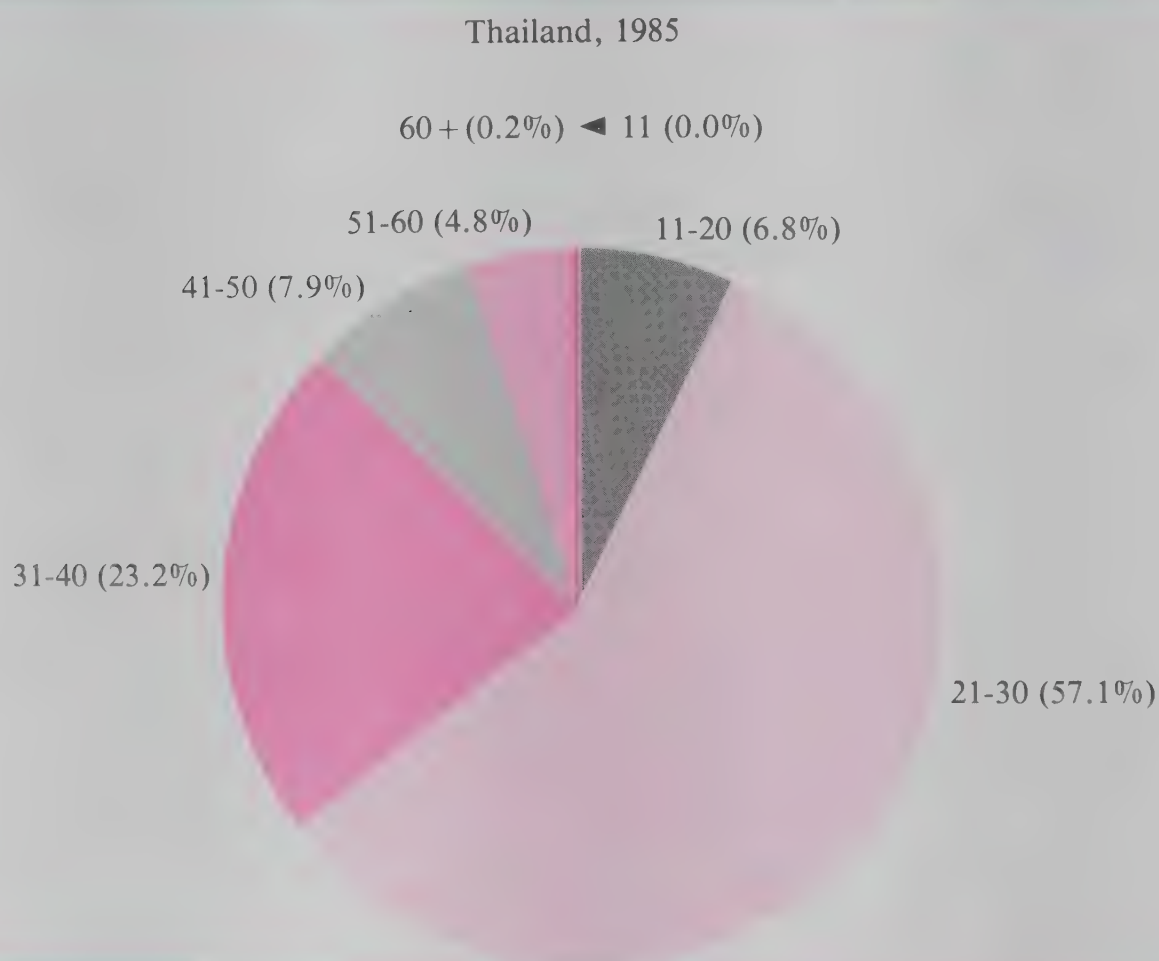
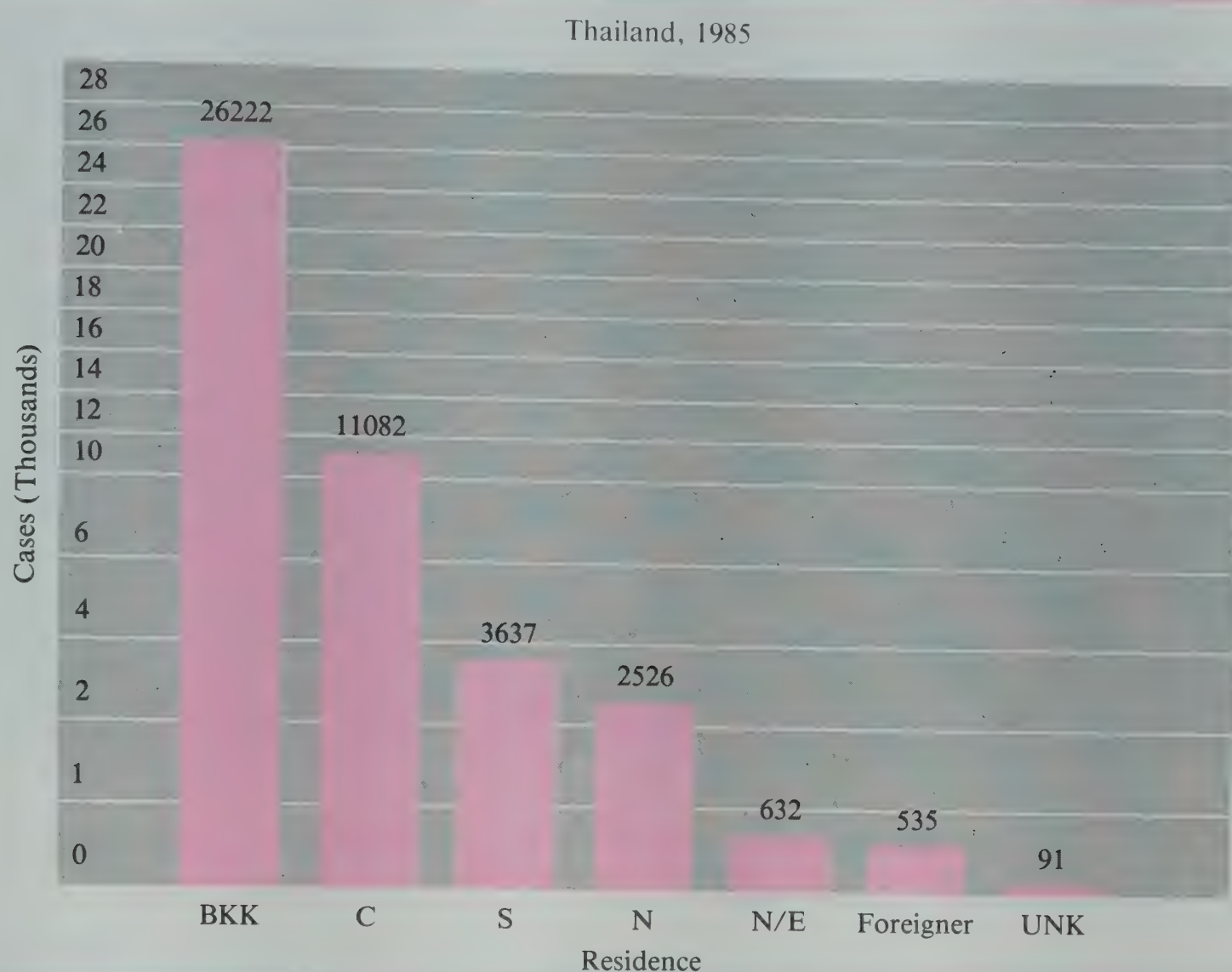


Figure 3.23 Cases of heroin addiction by residence, Thailand, 1985



5. CANCER

Since the last decade, Thailand has been faced with a different trend of health problem. The acute infectious diseases have been declining in both number and severity. On the contrary, most non-infectious diseases have been steadily increasing. Among these, cancer of all sites are now emerging as the third major cause of death in the Thai people.

Since the establishment of the National Cancer Institute of the Ministry of Public Health in 1968, there has been systematic methods of data collection and reporting about the incidence and distribution of cancer cases. Currently, the annual cancer statistics consist of reports from 145 collaborating institutes of both the governmental and private sector all over the country. Among the reported cases, 79 percent are histologically proven.

5.1 Morbidity and Mortality

In 1981, the incidence rate of cancer from all causes was 31.0 per 100,000 population with the death rate of 13.4 (Table 3.17 and 3.18). The trend of cancer morbidity and mortality during the past ten years from 1971-1981 increased gradually. This might be partly due to the improvement in the cancer registration system and also from real increases in the incidence rate due to various environmental hazards of the present living conditions.

Table 3.17 Incidence rate(per 100,000 population)for cancer of all sites by sex, Thailand, 1971-1981

Sex	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Male	12.0	11.3	14.4	15.4	14.9	15.3	13.9	15.5	19.1	25.5	28.4
Female	13.0	12.0	17.6	16.9	15.9	17.4	18.1	19.3	21.8	27.9	33.7
Total	12.6	12.2	16.1	16.3	15.6	16.5	16.2	17.4	20.7	27.1	31.0

Source : Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

Table 3.18 Cancer mortality rate(per 100,000 population)by sex,Thailand, 1971-1983

Sex	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Male	4.7	5.9	8.2	7.9	6.2	7.3	8.5	9.0	10.4	12.1	12.3	13.7	14.1
Female	3.7	5.1	5.8	5.9	5.7	6.3	7.1	7.8	8.6	10.3	10.5	12.0	12.6
Total	4.2	5.5	7.0	6.9	6.0	6.8	7.8	8.4	9.5	11.2	11.4	12.8	13.4

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1983

5.2 Epidemiology

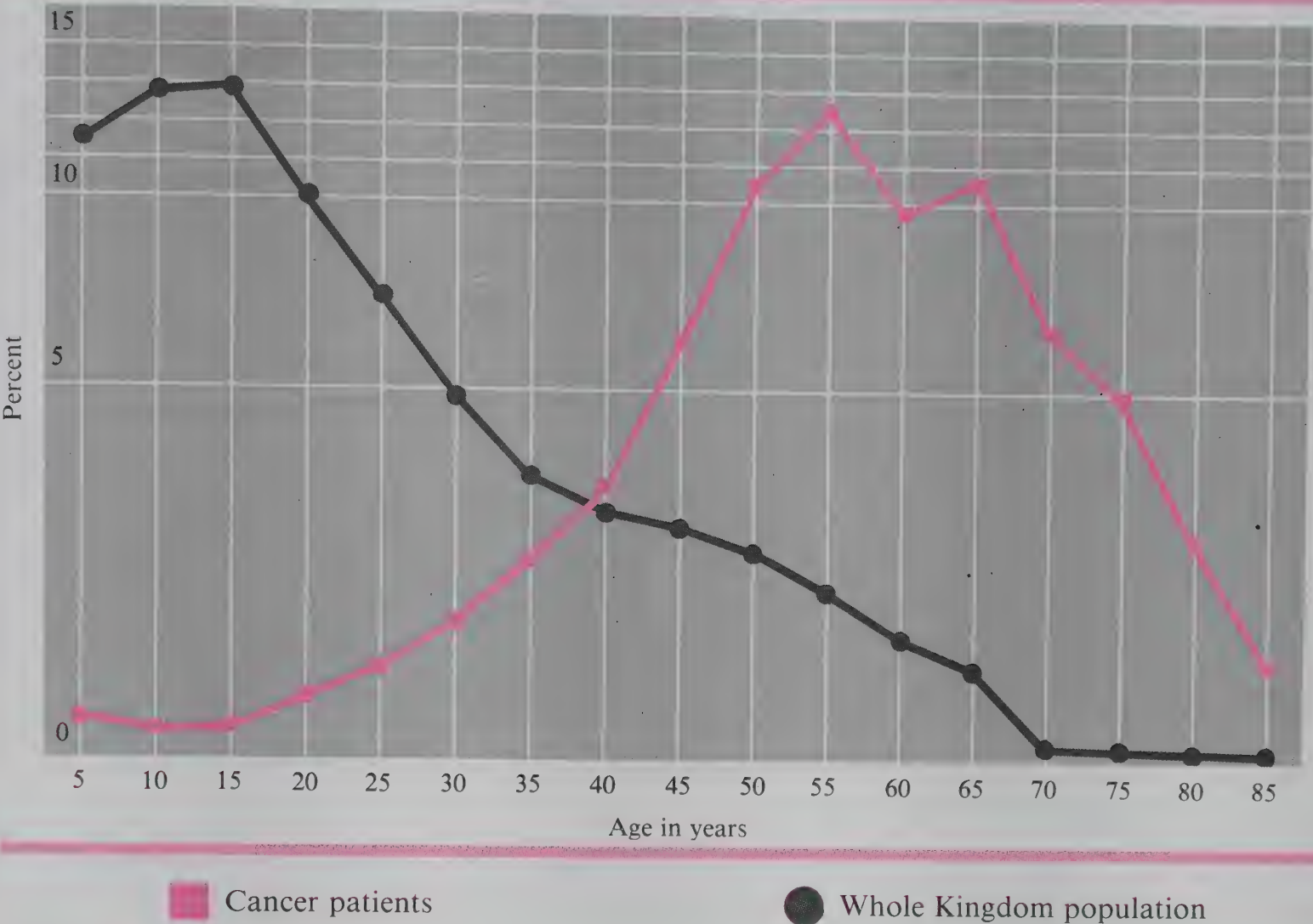
5.2.1 Patient characteristics

Cancer patients are an aging population when compared with the whole population (Figure 3.24). The age specific incidence rate in 1981 shows an increasing trend from the age of 30 years old, with a marked increase from 50 to 75+ years (Table 3.19). The mortality rate by age also follows a similar pattern with a slight decline after age 70 (Table 3.20).

There are also sex differences in cancer incidence and mortality. The reported cancer of all sites incidence rates for females during 1971-1981 indicate higher incidence than males. However, the male population faces higher death rate from cancer than females (Tables 3.21 and 3.22).

The analysis of the cancer patients by sex and occupation shows that proportionally more of the cancer group belongs to agricultural and retired population (Table 3.23).

Figure 3.24 Percent distribution by age of the cancer patients and Thai population, 1980



Sources : 1. Cancer Statistics 1980
2. Population and Housing Census Whole Kingdom, 1980 National Statistical Office, Thailand.

Table 3.19 Cancer incidence rate (per 100,000 population) by age group and sex, Thailand, 1981

Age Group	Sex		Total
	Male	Female	
0-4	2.59	2.51	2.55
5-9	2.06	1.75	1.91
10-14	1.89	1.66	1.78
15-19	3.69	3.48	3.59
20-24	5.95	7.29	6.61
25-29	6.65	13.09	9.83
30-34	12.43	27.67	19.93
35-39	20.18	41.44	30.69
40-44	46.46	84.32	65.64
45-49	72.98	121.56	98.07
50-54	122.59	148.70	136.11
55-59	141.79	134.92	138.21
60-64	200.94	167.72	183.39
65-69	260.00	170.00	211.54
70-74	328.64	187.60	351.25
75 +	371.34	193.33	267.40
Total	28.37	33.72	31.04

Source : Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

Table 3.20 Cancer death rate (per 100,000 population) by age group, Thailand, 1979-1983

Age group	1979	1980	1981	1982	1983
0-4	1.27	1.31	1.20	1.27	1.58
5-9	1.21	1.14	0.98	1.24	1.34
10-14	1.38	1.35	1.29	1.67	1.33
15-19	2.02	1.94	2.04	2.37	2.34
20-24	2.80	2.92	3.16	3.50	3.55
25-29	3.15	4.19	3.73	4.28	4.50
30-34	5.05	5.99	7.28	7.22	7.37
35-39	9.99	9.89	10.28	11.71	12.05
40-44	19.84	23.29	25.05	25.79	23.47
45-49	28.49	36.83	36.50	40.30	44.38
50-54	42.22	48.37	50.30	58.04	57.90
55-59	48.10	62.16	60.70	66.61	77.29
60-64	56.17	63.92	69.00	71.90	73.73
65-69	64.52	62.50	79.53	84.79	86.11
70-74	59.31	66.19	56.92	68.77	72.21
75 +	50.70	66.50	52.80	67.33	65.59

Source : Public Health Statistics , Division of Health Statistics, Ministry of Public Health, 1983

Table 3.21 Male death from cancer, number and rate (per 100,000 population) by age group, Thailand, 1979-1983

Age group	1979		1980		1981		1982		1983	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
0-4	46	1.41	50	1.53	45	1.37	45	1.37	45	1.37
5-9	46	1.47	45	1.44	30	0.95	43	1.35	56	1.75
10-14	46	1.49	50	1.59	45	1.44	66	2.12	41	1.32
15-19	58	2.22	55	2.04	67	2.38	78	2.68	71	2.37
20-24	63	2.87	65	2.88	80	3.42	95	3.93	93	3.73
25-29	54	2.87	88	4.54	85	4.28	78	3.83	95	4.45
30-34	74	4.71	91	5.55	125	7.40	118	6.78	124	6.91
35-39	127	10.94	116	9.48	124	9.48	159	11.45	182	12.42
40-44	183	20.26	195	20.92	248	25.43	255	24.95	255	23.76
45-49	240	29.52	325	39.16	327	39.44	367	43.95	369	43.46
50-54	310	45.65	359	51.51	387	53.97	447	60.73	482	63.92
55-59	299	55.06	383	68.03	363	62.69	452	75.97	520	85.11
60-64	284	73.38	338	34.50	346	81.79	391	88.06	425	91.59
65-69	251	87.46	285	96.28	333	111.00	319	104.25	342	108.57
70-74	144	77.84	198	103.12	112	56.28	206	100.00	193	90.61
75 +	113	71.07	153	93.29	124	72.51	141	79.66	163	88.59

Source : Public Health Statistics , Division of Health Statistics, Ministry of Public Health, 1983

Table 3.22 Female cancer death, number and rate (per 100,000 population) by age group, Thailand, 1979-1983

Age group	1979		1980		1981		1982		1983	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
0-4	35	1.12	34	1.08	32	1.02	37	1.18	56	1.79
5-9	28	0.93	25	0.83	31	1.02	34	1.12	28	0.91
10-14	38	1.27	33	1.09	34	1.13	36	1.20	40	1.34
15-19	46	1.81	48	1.83	46	1.68	58	2.06	67	2.31
20-24	58	2.73	65	2.96	66	2.90	72	3.05	82	3.36
25-29	63	3.44	72	3.82	61	3.16	94	4.74	91	4.46
30-34	82	5.41	102	6.45	117	7.15	130	7.68	137	7.84
35-39	131	11.39	124	10.31	142	11.1	162	11.97	166	11.66
40-44	184	19.43	248	25.56	247	24.67	276	26.61	250	23.17
45-49	239	27.53	307	34.65	299	33.75	329	36.88	409	45.24
50-54	282	39.00	338	45.43	361	46.88	441	55.54	427	52.33
55-59	246	41.69	348	56.77	366	58.09	376	58.02	467	70.12
60-64	176	40.74	204	45.53	273	57.59	287	57.51	302	57.85
65-69	149	44.74	185	53.78	184	52.57	244	68.16	247	66.94
70-74	98	43.94	91	39.39	89	36.78	109	42.46	150	57.25
75+	83	36.72	111	47.64	93	38.75	146	58.87	130	50.78

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1983

Table 3.23 Cancer patients by sex and occupation, Thailand, 1981

Occupation	Number of patients			Percent
	Male	Female	Total	
Agriculture	2126	2448	4574	31.03
Trader	508	708	1216	8.25
Official	299	157	456	3.09
Labour	700	629	1329	9.02
Retired, house wife	1870	2926	4566	30.98
Student	119	82	201	1.36
Priest	269	28	297	2.02
Preschool children	128	118	246	1.67
Others	125	96	221	1.50
Unknown	629	1004	1633	11.08
Total	6773	7966	14739	100.00

Source : Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

5.2.2 Leading cancer sites

The leading cancer sites in male in 1981 were: liver, lung, oral cavity, stomach, skin and oesophagus respectively. The incidence rate for liver cancer was 4.53 per 100,000 male population; it comprised about 16 percent of all cancer occurring in the male population (Table 3.24).

In females, the leading cancer in 1981 was cancer of the cervix uteri with an annual incidence rate around 10 per 100,000 female population. Other leading cancer sites were breast, liver, oral cavity, ovary and colorectum respectively (Table 3.25).

The age specific incidence rates for major cancers in male and female indicated that liver, lung and oral cavity cancer were steadily increasing with age. Breast cancer in males occurred at a very low incidence compared to females breast cancer and the age trend for this cancer in females seemed to decrease after menopause but increased slightly again after age 69 (Table 3.26 and 3.27).

For cervical cancer, the highest incidence rate was at the age of 50-59, after that the incidence declined gradually as age increased.

Table 3.24 Incidence rate (per 100,000 population) of the ten leading sites of cancer in male, Thailand, 1981

Sites	Number	Rate	Percent
All sites	6773	28.38	100.00
Liver	1081	4.53	15.96
Lung	890	3.72	13.14
Oral cavity	517	2.17	7.63
Colorectum	448	1.88	6.61
Stomach	355	1.49	5.24
Skin	338	1.42	4.99
Oesophagus	302	1.26	4.46
Larynx	279	1.17	4.12
Nasopharynx	269	1.13	3.97
Penis	248	1.04	3.66

Source : Calculated from Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

Table 3.25 Incidence rate (per 100,000 population) of the ten leading sites of cancer in female, Thailand, 1981

Sites	Number	Rate	Percent
All sites	7699	3.72	100.00
Cervix uteri	2317	9.81	29.09
Breast	912	3.86	11.45
Liver	509	2.15	6.39
Oral cavity	504	2.13	6.33
Ovary	383	1.62	4.81
Colorectum	333	1.41	4.18
Lung	327	1.38	4.10
Thyroid	293	1.24	3.68
Skin	289	1.22	3.63
Uterus	254	1.07	3.19

Source : Calculated from Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

Table 3.26 Age-specific incidence rate (per 100,000 population) of special cancer sites in male , Thailand, 1981

Site	◀20	20-29	30-39	40-49	50-59	60-69	70 +
Liver	0.02	0.25	1.74	7.98	13.43	17.59	18.11
Lung	0.01	0.07	0.97	5.49	15.97	27.94	31.62
Oral cavity	0.02	0.19	0.53	2.94	8.64	18.67	39.19
Breast	0.00	0.00	0.00	0.00	0.00	0.14	0.27
Penis	0.00	0.02	0.23	0.72	1.31	0.97	0.81

Source : Calculated from Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

Table 3.27 Age-specific incidence rate (per 100,000 population) of special cancer sites in female , Thailand, 1981

Site	◀20	20-29	30-39	40-49	50-59	60-69	70 +
Cervix uteri	0.02	0.24	1.54	7.26	9.64	7.52	4.77
Liver	0.02	0.19	0.79	3.76	7.21	7.40	7.68
Lung	0.01	0.10	0.34	2.54	6.00	8.25	6.85
Oral cavity	0.02	0.17	0.31	1.85	8.00	15.78	34.65
Breast	0.00	0.21	0.93	2.49	1.86	2.18	2.28

Source : Calculated from Cancer Statistics, National Cancer Institute, Ministry of Public Health, 1981

5.2.3 Geographical distribution

Comparing the incidence rate of cancer of all sites among the 4 regions of Thailand, the central region including Bangkok had the highest incidence of 40.8 per 100,000 population while the incidence rates of the northeast, the north and the southern regions were 18.4, 34.5 and 21.9 per 100,000 respectively (Figure 3.25).

The central region had the highest rates for cervical cancer, oral cavity, breast, colorectum, oesophageal and nasopharyngeal cancer. The northern region had the highest rate of lung and stomach cancer. The northeastern region had the higheast rate of liver cancer (Figures 3.26-3.34).

Figure 3.25 Cancer incidence rate by region, Thailand, 1981

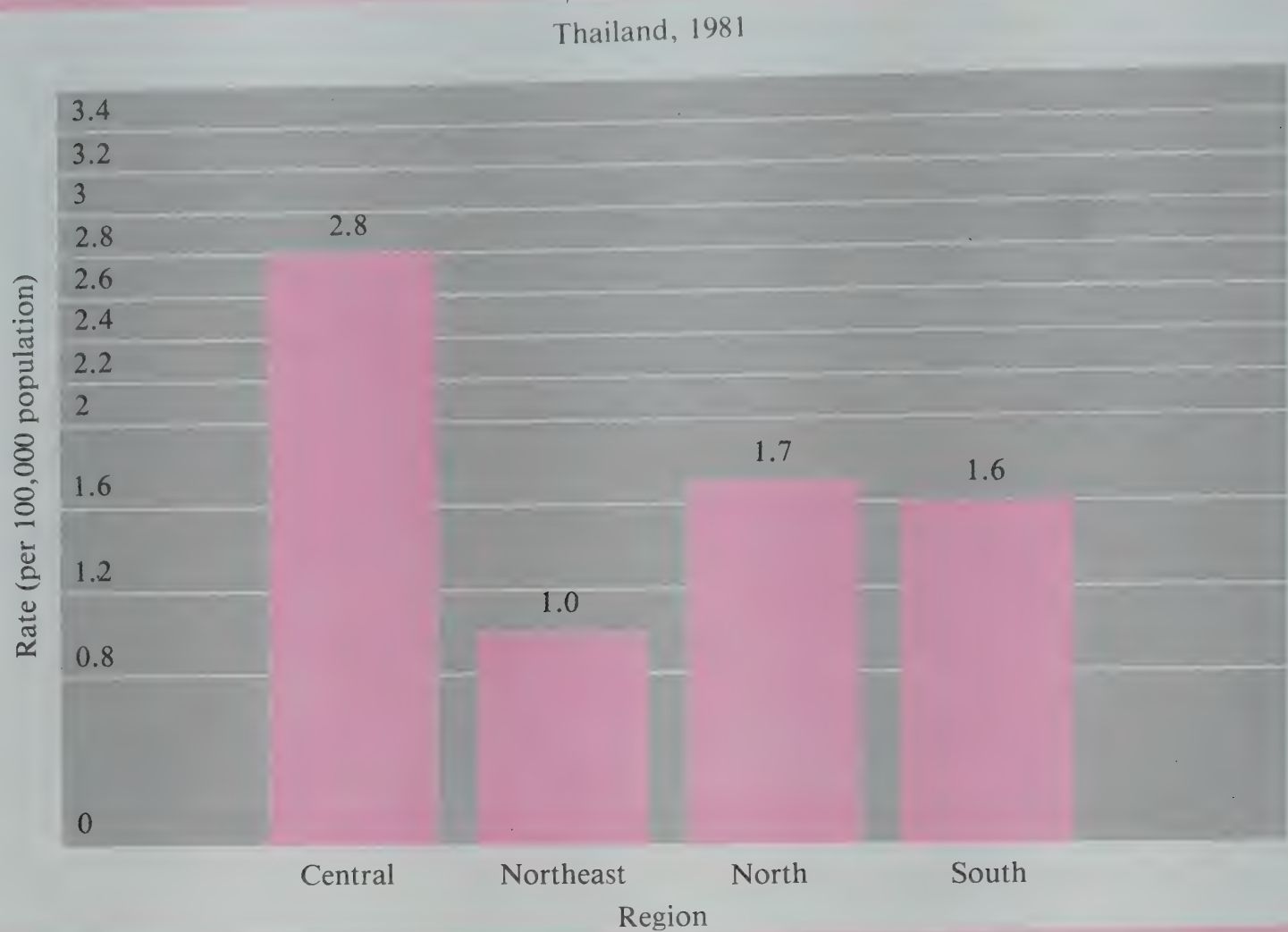


Figure 3.26 Rate of breast cancer by region, Thailand, 1981

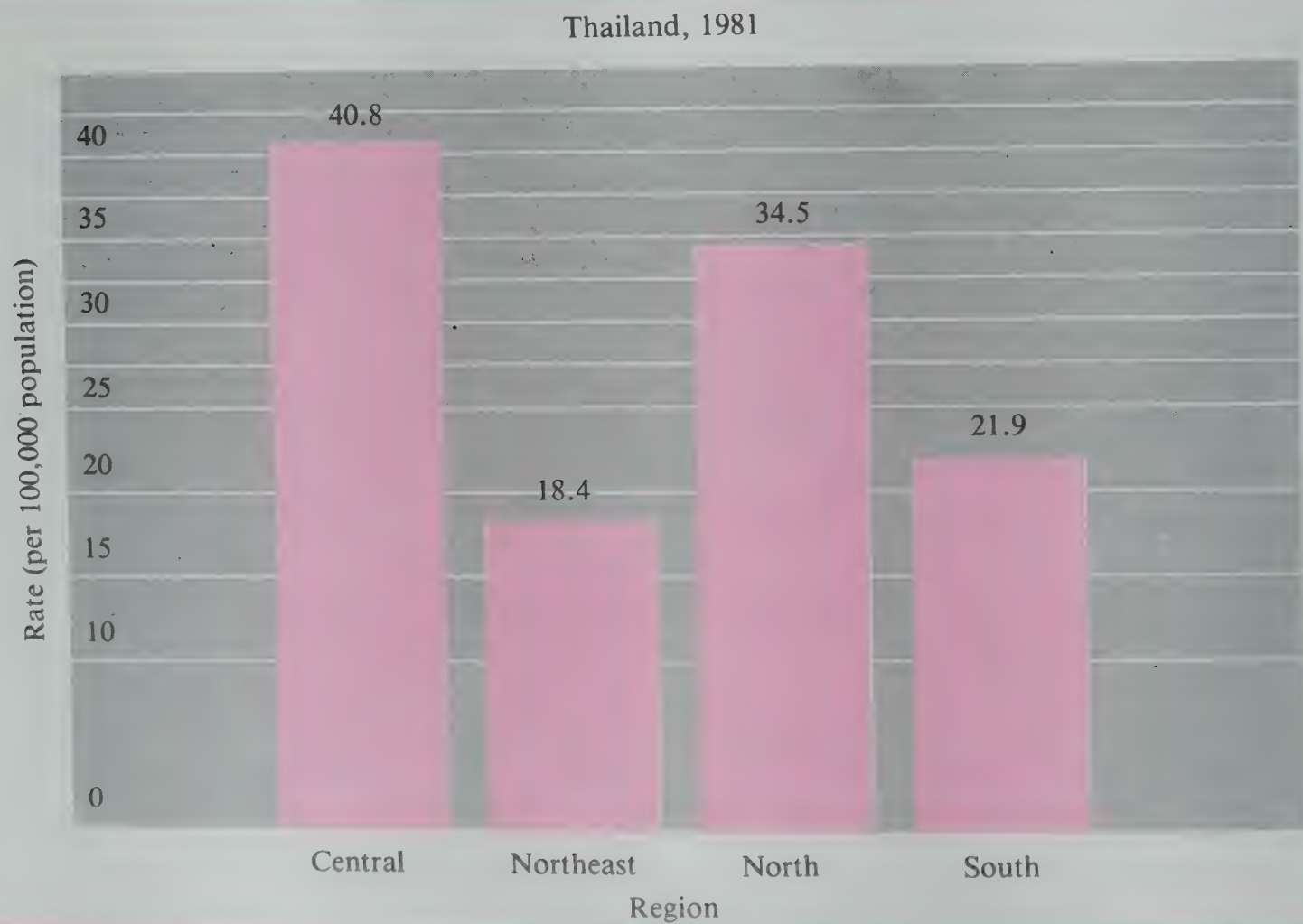


Figure 3.27 Rate of colorectum cancer by region, Thailand, 1981

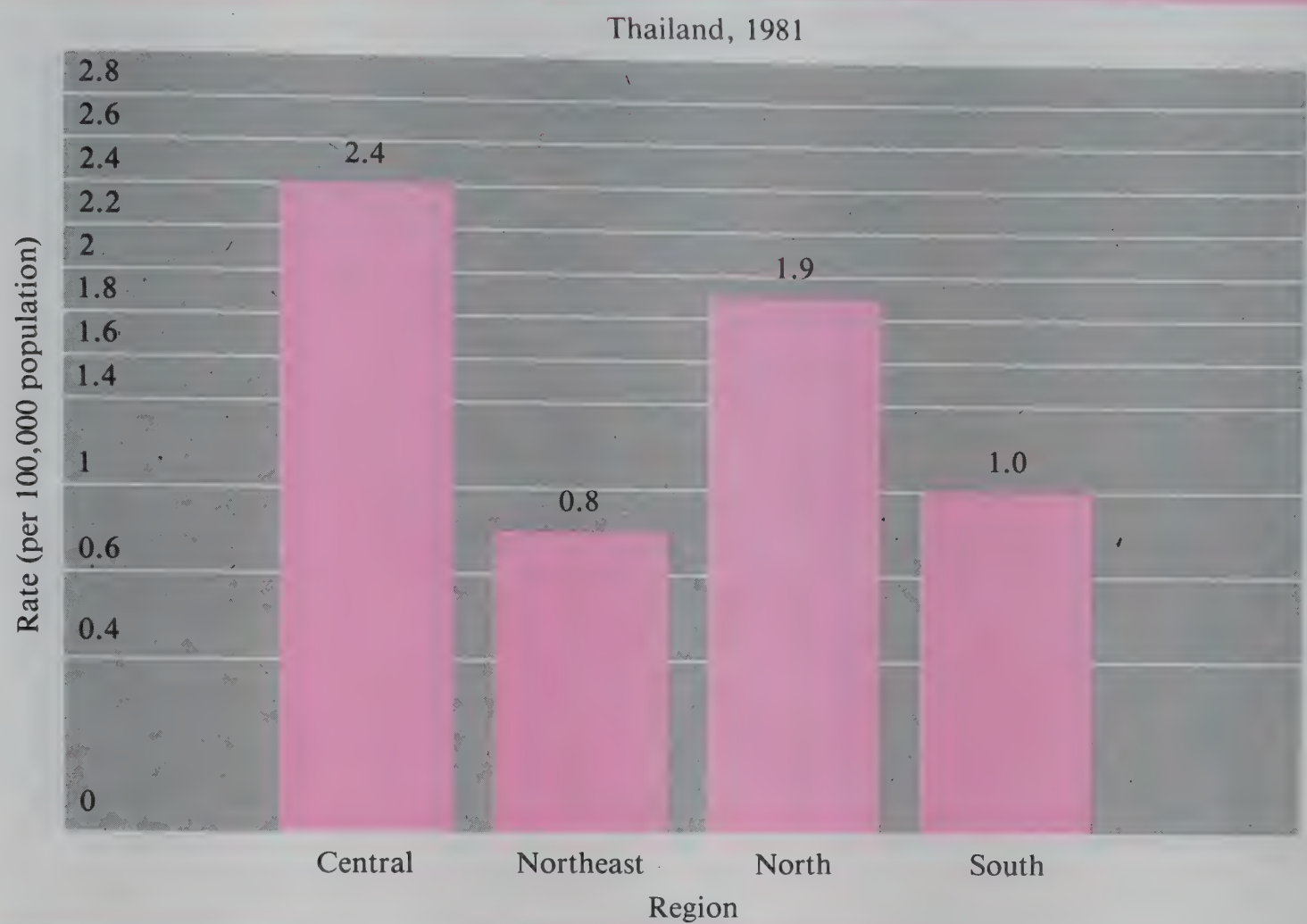


Figure 3.28 Rate of stomach cancer by region, Thailand, 1981

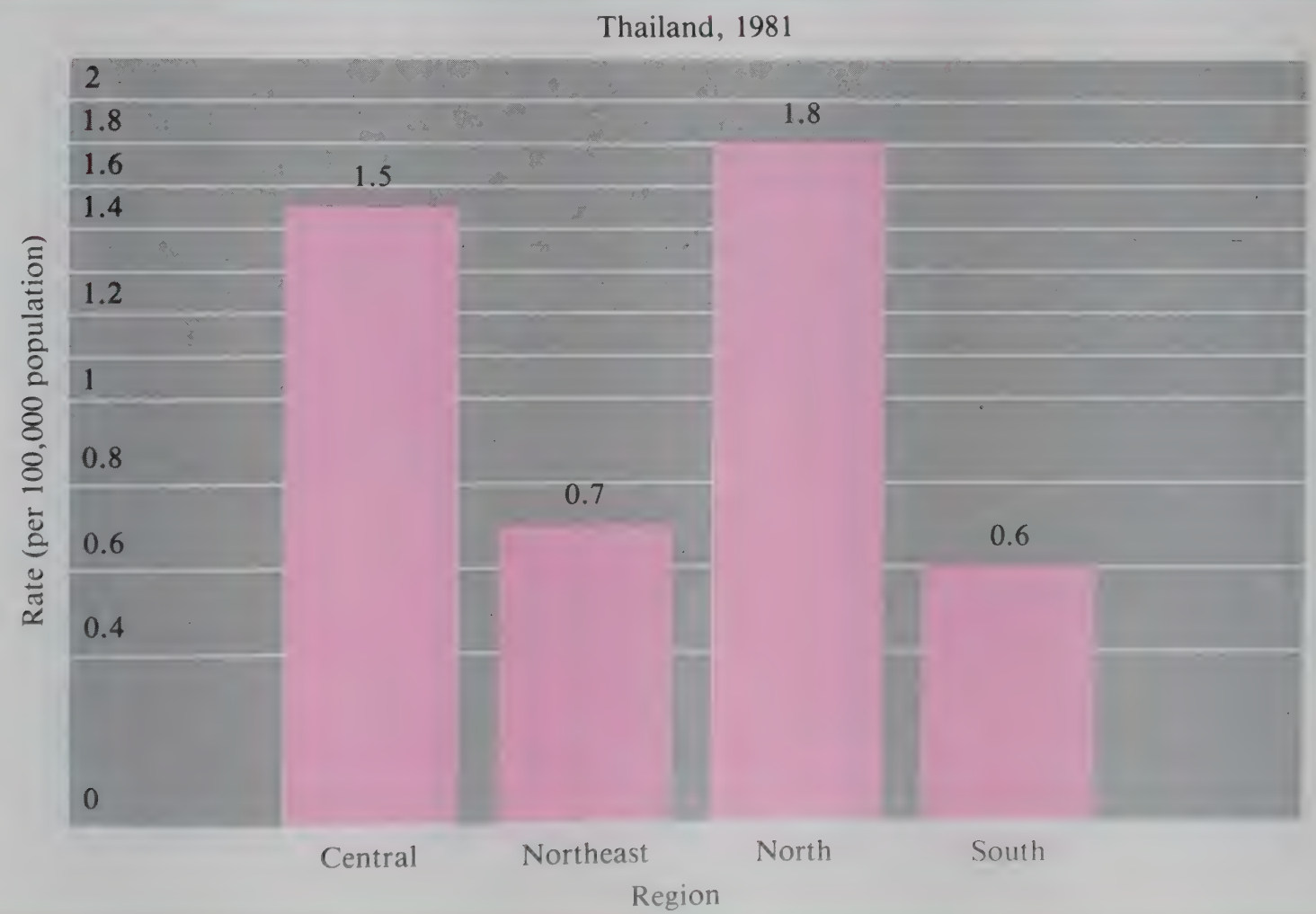


Figure 3.29 Rate of oesophageal cancer by region, Thailand, 1981

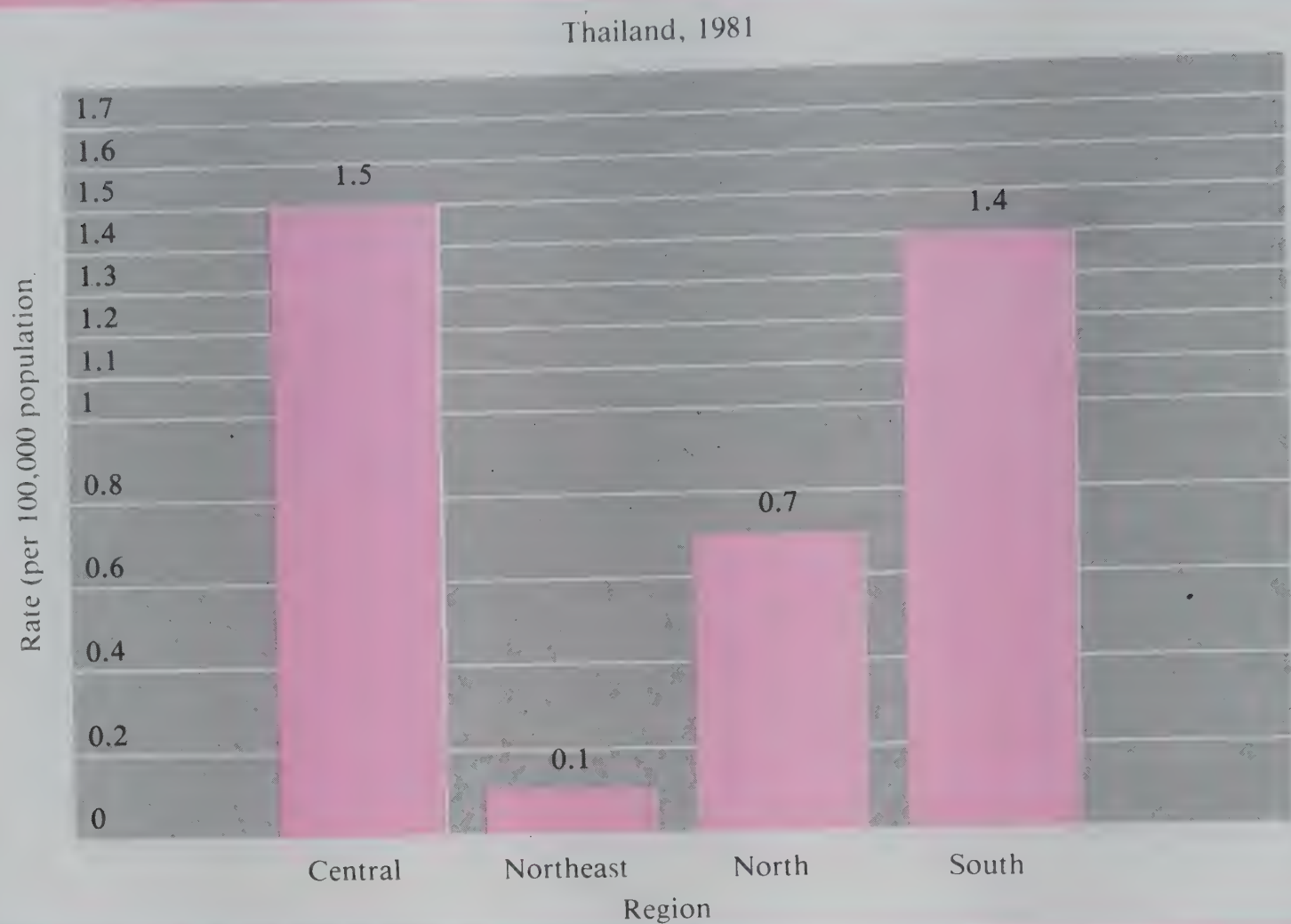


Figure 3.30 Rate of liver cancer by region, Thailand, 1981

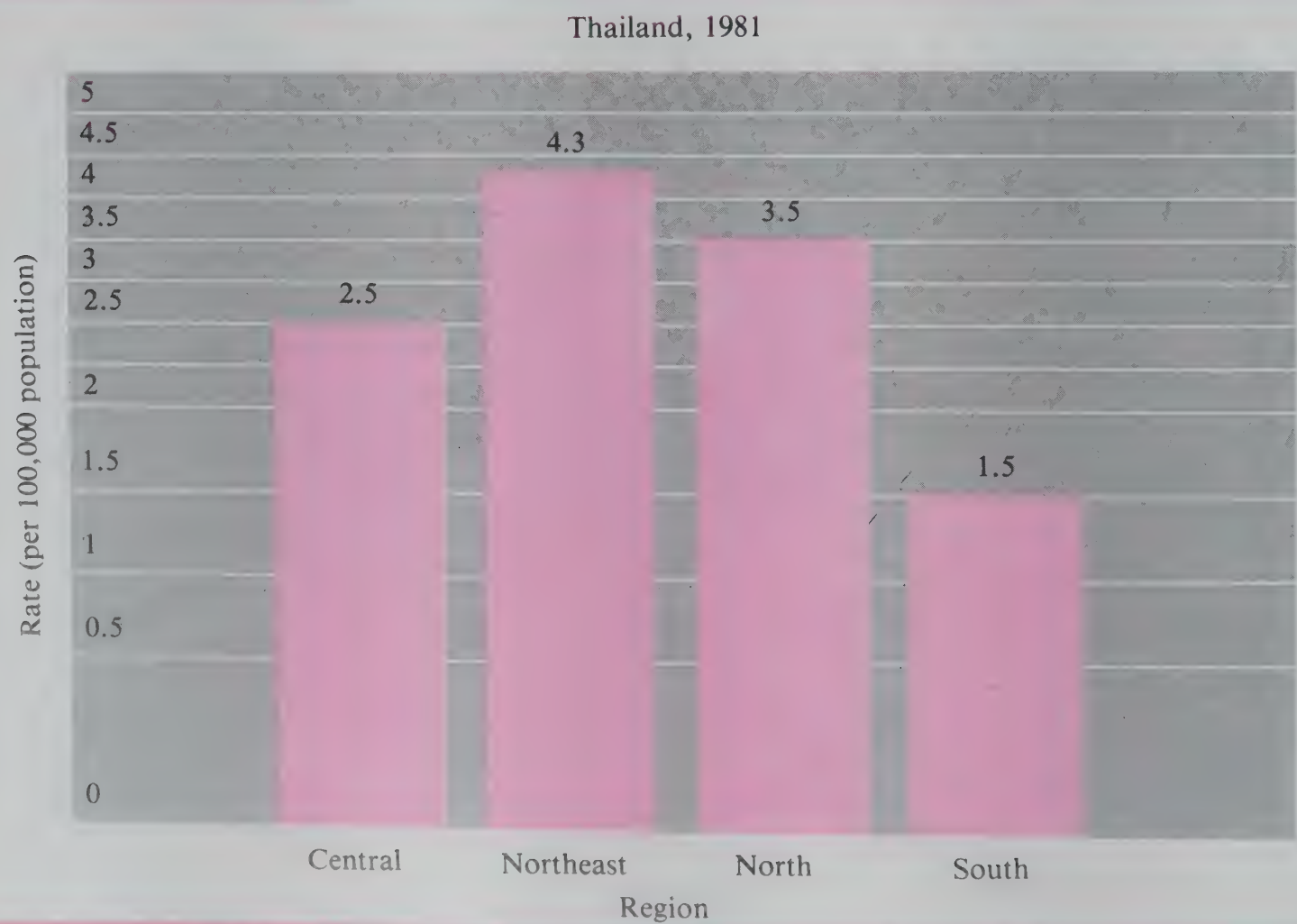


Figure 3.31 Rate of oral cavity cancer by region, Thailand, 1981

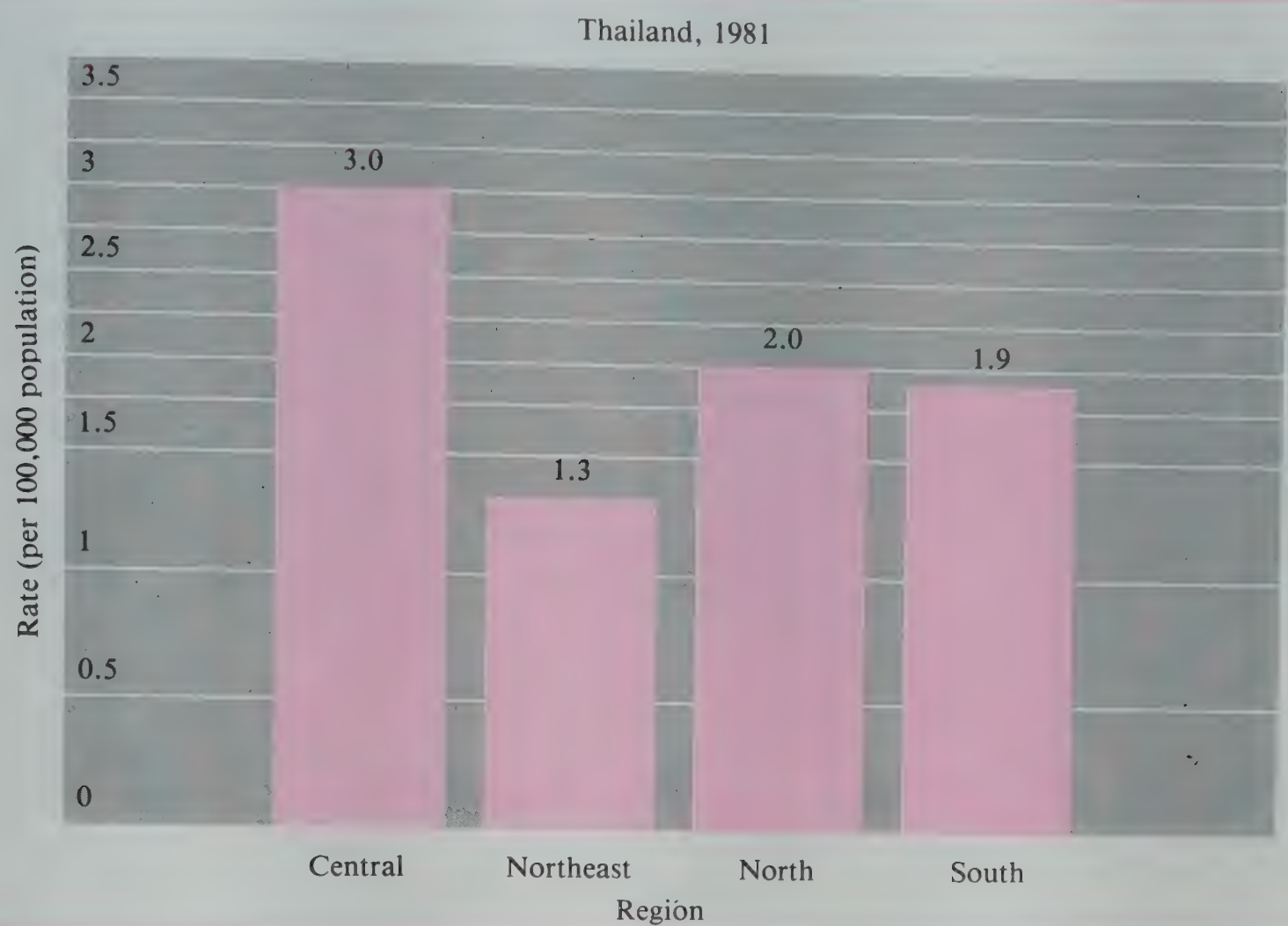


Figure 3.32 Rate of cervix uteri cancer by region, Thailand, 1981

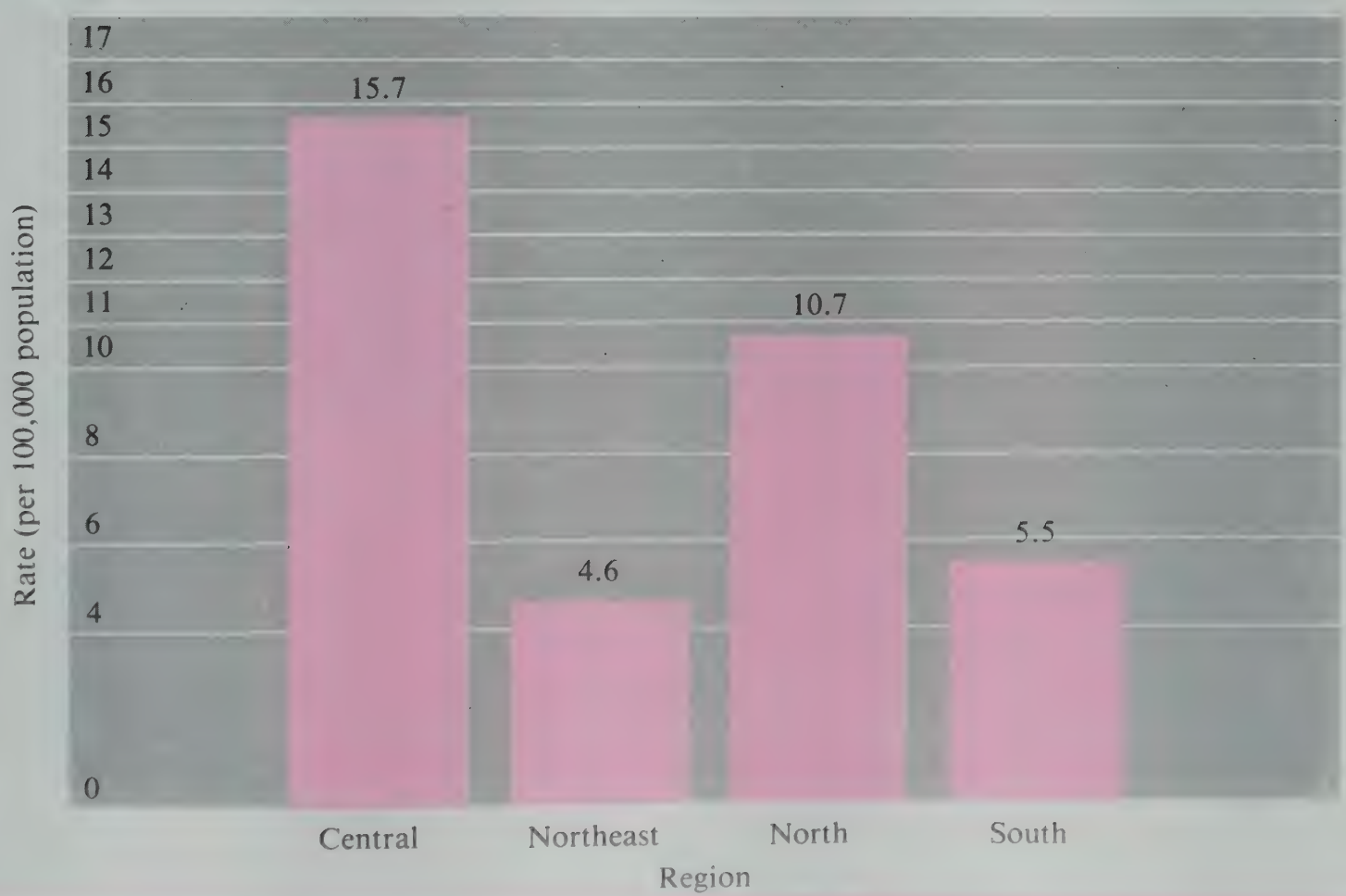


Figure 3.33 Rate of lung cancer by region, Thailand, 1981

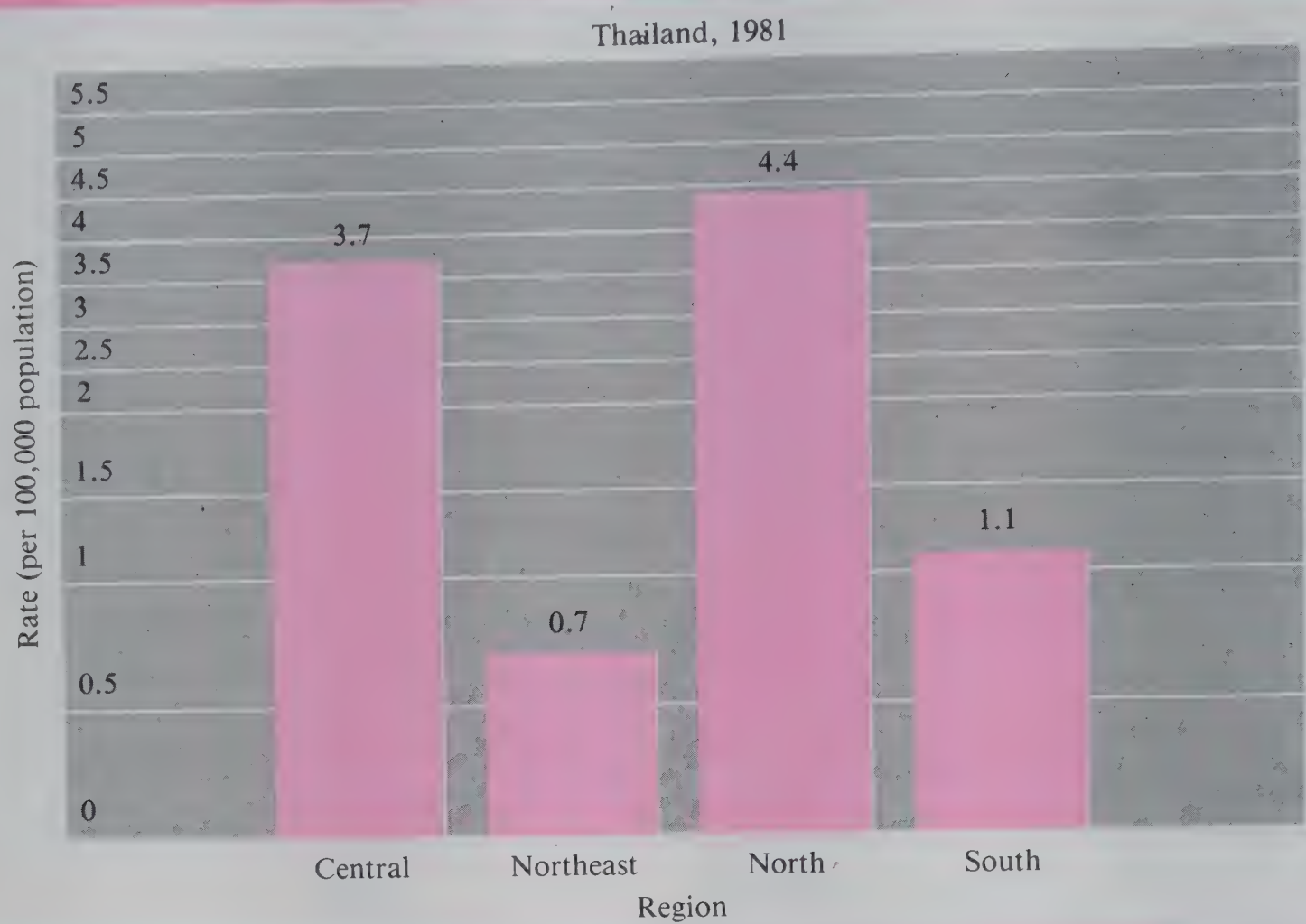
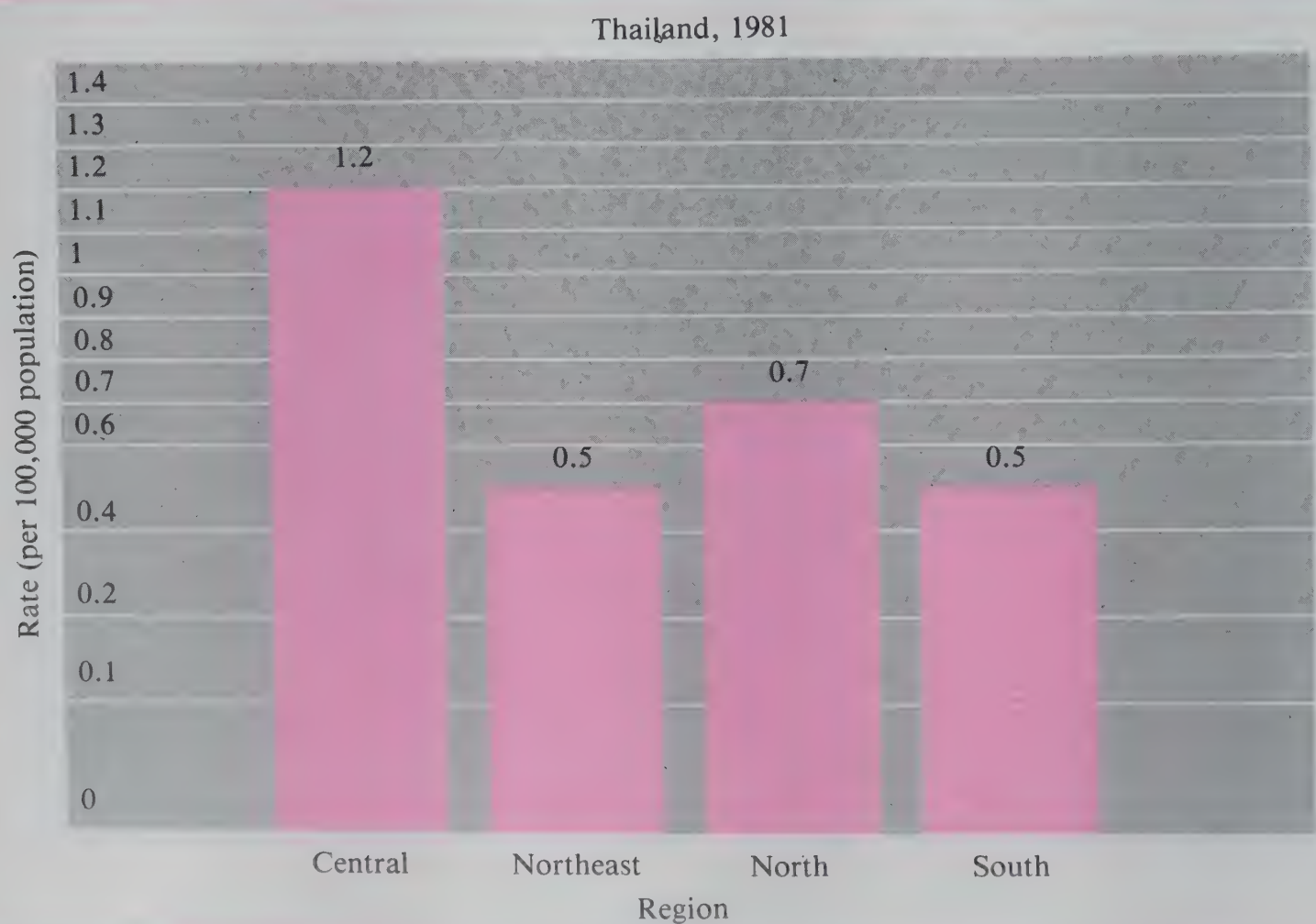


Figure 3.34 Rate of nasopharynx cancer by region, Thailand, 1981



5.3 Cancer Risk-factor Studies

The analytic epidemiological studies about risk factors of important cancer in Thailand are still needed. The focus is on the two leading cancers in males and females: liver and cervical cancer. Tables 3.28 and 3.29 summarize epidemiological studies about these important cancers.

In cervical cancer studies (Table 3.28), the high risk groups were women exposed to sexual intercourse, and whose age was between 30-49 years with high fertility. The most common cell type was squamous cell carcinoma. Positive history of repeated vaginal infections in relation to Herpes simplex Type I was also proven to be a risk factor. Follow-up studies were conducted mostly for evaluation of treatment methods; the result of 5-year survival rates showed a difference in survival between squamous cell carcinoma and adenocarcinoma.

For liver cancer (Table 3.29), the study from NCI indicated a higher incidence in males than females, with the highest incidence rate in the northeastern region. Hepatocellular carcinoma was found at the youngest age of less than 1 year while adenocarcinoma was found in the older age group, usually more than 25 years. The case-control study by Yongchaiyuddha (1978) showed that AFP (alpha fetoprotein) could be used to detect primary hepatoma.

Table 3.28 Epidemiological studies of cervical cancer in Thailand

Type of study design	Investigators	Data sources	Main findings														
Descriptive study	Punyaratabandhu 1982	Analysis of 4,222 hospitals summary records of the cervical cancer patients from 4 hospitals and institutes in Bangkok during the year 1974-1978	- 61.2% age between 30-49 years 0.1% less than 20 years - 96% married - 72% had 3-10 children/patients - 42% housewives the patients came from every region of the country, majority were in Bangkok and Thonburi Cell type - 86.3% squamous cell CA Duration of hospital staying 15-34 days.														
	Vardthananusara 1966	Hospital records of cervical cancer patients admitted in Siriraj Hospital from 1957-1975 total number of 5,170 patients	- 55.5% age range 30-49 years 25.2% age between 50-59 years - Cell type - 86.6% squamous cell CA - the patients came to receive treatment mostly at stage 2-3 of the disease														
Analytic study - Case-control study	Punyaratabandhu et al 1982 (Epidemiologic study of risk factors in cancer of the cervix uteri in Thai woman)	212 historical confirmed cervical cancer patients admitted in 4 hospitals in Bangkok matched by age with 212 gynaecological patients with other diseases whose pap. smear confirmed no cervical cancer at the time of admission	Risk factors for cervical cancer were identified <table><tr><td></td><td>Odd ratio</td></tr><tr><td>- 3 or more live births</td><td>3.15</td></tr><tr><td>- 3 or more pregnancies</td><td>2.90</td></tr><tr><td>- multiple marriage</td><td>2.91</td></tr><tr><td>- exposed to sexual intercourse</td><td>17.00</td></tr><tr><td>- positive history of vaginal infection</td><td>2.75</td></tr><tr><td>- positive history of STD in husband</td><td>2.28</td></tr></table> Combinations of these risk factors increased the value of R.R.		Odd ratio	- 3 or more live births	3.15	- 3 or more pregnancies	2.90	- multiple marriage	2.91	- exposed to sexual intercourse	17.00	- positive history of vaginal infection	2.75	- positive history of STD in husband	2.28
		Odd ratio															
- 3 or more live births	3.15																
- 3 or more pregnancies	2.90																
- multiple marriage	2.91																
- exposed to sexual intercourse	17.00																
- positive history of vaginal infection	2.75																
- positive history of STD in husband	2.28																
	Vardthananusara et al 1978 (Herpes Simplex Virus type 2 and carcinoma of cervix uteri)	103 cervical cancer patients and 93 control patients of other gynaecological conditions were study for HSV type 1 + 2 antibodies by neutralization test	- case had higher number of gravidity and marriage than control <table><tr><td></td><td>squamous CA</td><td>control</td></tr><tr><td>Ab. to HSV1</td><td>29.79%</td><td>35.50%</td></tr><tr><td>Ab. to HSV2</td><td>62.76%</td><td>43.00%</td></tr><tr><td>Negative to both</td><td>7.45%</td><td>21.50%</td></tr></table>		squamous CA	control	Ab. to HSV1	29.79%	35.50%	Ab. to HSV2	62.76%	43.00%	Negative to both	7.45%	21.50%		
	squamous CA	control															
Ab. to HSV1	29.79%	35.50%															
Ab. to HSV2	62.76%	43.00%															
Negative to both	7.45%	21.50%															
Follow up study	Vootiprux et al 1980 (Results of treatment of adenocarcinoma of the cervix uteri by radiation therapy)	From 2,248 cervical cancer patients admitted at Siriraj hospital during 1973-1976. Among these 222 were adenocarcinoma. Two types of treatment: radiation and radiation plus operation were performed and followed up for survival status	Five year survival rate - stage 1 after operation 53.8% - stage 2 62.0% - stage 3 27.3% - stage 4 0.0% The 5 years survival rate in adenocarcinoma was lower than squamous cell carcinoma and less sensitive to radiation therapy														
Follow up study	Chokkanapitak 1981 (Survival from carcinoma stage II & III result of radiation treatment and other related factors)	The data was derived from patients records registered during 1973-1976 at Cancer Institute, Siriraj hospital and each patient was followed up for 5 years after receiving therapy, yielding 609 patients	- 5 year survival status was associated with the stage of disease - for stage II survival rate by direct methods was 58.85% and stage III was 33.58%														

Table 3.29 Epidemiological studies of liver cancer in Thailand

Type of study design	Investigators	Data sources	Main findings
Descriptive study	Srivatanakul and Sontipong 1982 (Incidence of liver cancer in Thailand 1979)	Data collected by NCI from 120 hospitals in 1979 yield 1,109 liver cancer patients.	<ul style="list-style-type: none">- rate in male 3.55/100,000 pop. in female 1.26/100,000 pop.- ratio M:F 2.85:1- highest incidence in the northeast- lowest incidence in the south- cell type:<ul style="list-style-type: none">- hepatocellular CA found mostly in central part- Cholangiocarcinoma found mostly in northeast- highest incidence was between age 35-65
Analytic study - Case-control study	Yongchaiyudha 1978 (Epidemiological study of primary hepatoma in Thailand)	147 hepatoma patients at Siriraj hospital were compared with several group of patients without hepatoma	<ul style="list-style-type: none">- the alpha fetoprotein (AFP) was observed in 74.8% of patients with hepatoma- AFP decreased with increasing age

6. DIABETES MELLITUS

In developed and most developing countries, the major non-communicable diseases, such as, cardiovascular diseases, cancer, and non-insulin dependent diabetes mellitus (NIDDM) are responsible for two-thirds of all deaths. Diabetes mellitus (DM) is a common disease in affluent societies, affecting from 1 to 3 percent of the general population, and often 5 to 10 percent of those over 40 years of age. Mortality is significantly increased in DM and life expectancy is shortened (Mann et al 1983). Diabetes prevalence surveys conducted in Thailand showed the prevalence ranges from 2.5 to 3.5 percent of population. The rate is about 10 percent among those over 40 years of age (Bunnag et al. 1982, Unagool 1982, King et al. 1983). In Chonburi province, the prevalence of diabetes was 3.4 percent in the adult population (Table 3.30).

The morbidity and mortality data of diabetes mellitus are obtained from different sources and diagnostic procedures. They are subjected to some limitations. Interview data may have under-estimated the prevalence because of the omission of undiagnosed cases. There is no confirmatory test for the survey data in Table 3.30.

Table 3.30 Morbidity and mortality rates of diabetes mellitus among the Thai population

Study area	Population	Study sample size	Diagnostic tools	Diagnostic finding	
Unagool (1982)					
Whole kingdom	All age	Not specified 300,000	Urine exam	Prevalence rate	
				Total	2.5%
				◀ 20 yrs.	0.3%
				21-40	1.5%
				▶ 40 yrs.	10.0%
Angkasuvapala et al (1983)					
Chonburi province	Adult 15 + yrs.	Purposive sample 10 Tambols, 1,060	Health examination FBS ▶ 140 mg/dl	Prevalence rate	
				Total	3.4%
				Known cases	2.5%
				Unknown cases	0.9%
Tuchinda et al (1984)					
Whole kingdom	Thai children age 0-15 yrs.	476 hospitals	Questionnaire	Incidence rate 0.19/100,000/yrs. 36 newly diagnosed cases	
Chamratrithirong et al (1985/1986)					
Whole kingdom	All age	Stratified two- stage sampling and self- weighting 292,212	Questionnaire	Death rate	
				Total	9.2/100,000
				Male	6.3/100,000
				Female	12.0/100,000

7. DISEASES OF THE DIGESTIVE SYSTEM

Diseases of the digestive system can be divided into diseases of oral cavity, salivary glands, and jaws (ICD 520-529) and diseases of other parts of the digestive system (ICD 530-579). The morbidity and mortality of diseases of the oral cavity, salivary glands and jaws are not substantial. The diseases of other parts of the digestive system (DOPDS) will thus be mainly focused upon; they can be further divided into:

1. diseases of oesophagus (ICD 530),
2. diseases of stomach and duodenum (ulcer) (ICD 531-533),
3. appendicitis (ICD 540-543),
4. hernia and intestinal obstruction (ICD 550-553, 560),
5. chronic liver diseases and cirrhosis (ICD 571),
6. cholelithiasis and cholecystitis (ICD 574-575.1),
7. others.

Data were obtained from the Division of Health Statistics and from the Statistical Report by the Department of Medical Services.

7.1 Morbidity and Mortality

The mortality rate of the diseases of other parts of the digestive system was between 22-24 per 100,000 population between 1979-1983 (Table 3.31). Of the 22.4 deaths per 100,000 in 1983, 8.6 can be granted to cirrhosis and chronic liver diseases (Table 3.32) and possibly around 10 to appendicitis, hernia, intestinal obstruction and peptic ulcer (Prasartkul 1985).

The incidence rate of the digestive system diseases (outpatient) was between 52.3-66.4 per 100,000 population between 1981-1983 (Table 3.33).

The mortality trend of the digestive system diseases has been relatively stable during the past 5 years (Table 3.31); on the contrary, the cirrhosis death rate appears to be increasing, both in males and females (Table 3.32).

7.2 Distribution by Sex, Region and Age

Both the diseases of other parts of the digestive system and cirrhosis death rates were twice as high in males as in females (Table 3.31 and 3.32).

Cirrhosis death rates were highest in the northeastern region (14.1/100,000) and lowest in the southern region (4.5/100,000) in 1983 (Table 3.34).

Fully 70% of cirrhosis is found between the ages of 40-70 (Figure 3.35).

Table 3.31 Number of deaths and death rate(per 100,000 population) from diseases of the digestive system other than diseases of the oral cavity, salivary glands and jaws by sex (ICD = 531-534, 540-543, 550-553, 560, 571, 573),Thailand, 1979-1983

	All		Male		Female	
	Number	Rate	Number	Rate	Number	Rate
1979	11002	24.2	7296	31.9	3706	16.4
1980	10466	22.5	6975	29.9	3491	15.1
1981	10779	22.7	7257	30.4	3522	14.9
1982	11713	24.2	7898	32.0	3905	16.2
1983	11051	22.4	7352	29.6	3699	15.0

Source : Public Health Statistics , Division of Health Statistics, Ministry of Public Health, 1979-1983

Table 3.32 Number of deaths and death rate (per 100,000 population) from chronic liver disease and cirrhosis by sex (ICD = 571), Thailand, 1979-1983

	All		Male		Female	
	Number	Rate	Number	Rate	Number	Rate
1979	1962	4.3	1455	6.4	507	2.2
1980	2414	5.2	1733	7.4	681	2.9
1981	3274	6.9	2376	10.0	898	3.8
1982	3993	8.2	2837	11.6	1156	4.8
1983	4259	8.6	3014	12.1	1245	5.1

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1979-1983

Table 3.33 Number, rate (per 100,000 population) and percent of outpatients of digestive system diseases by region, Thailand, 1981-1983

	Whole Country			North			Northeast		
	Number	Rate	Percent	Number	Rate	Percent	Number	Rate	Percent
1981	2128605	52.3	12.0	450789	45.8	11.2	861046	53.7	13.5
1982	2625276	61.1	12.4	540316	54.0	11.5	1081738	63.1	14.3
1983	2902810	66.4		603373	59.4		1148150	65.6	

	Central			South		
	Number	Rate	Percent	Number	Rate	Percent
1981	581511	60.5	11.7	235250	45.3	10.1
1982	686256	70.1	11.9	316966	52.8	10.1
1983	787462	79.1		363825	59.5	

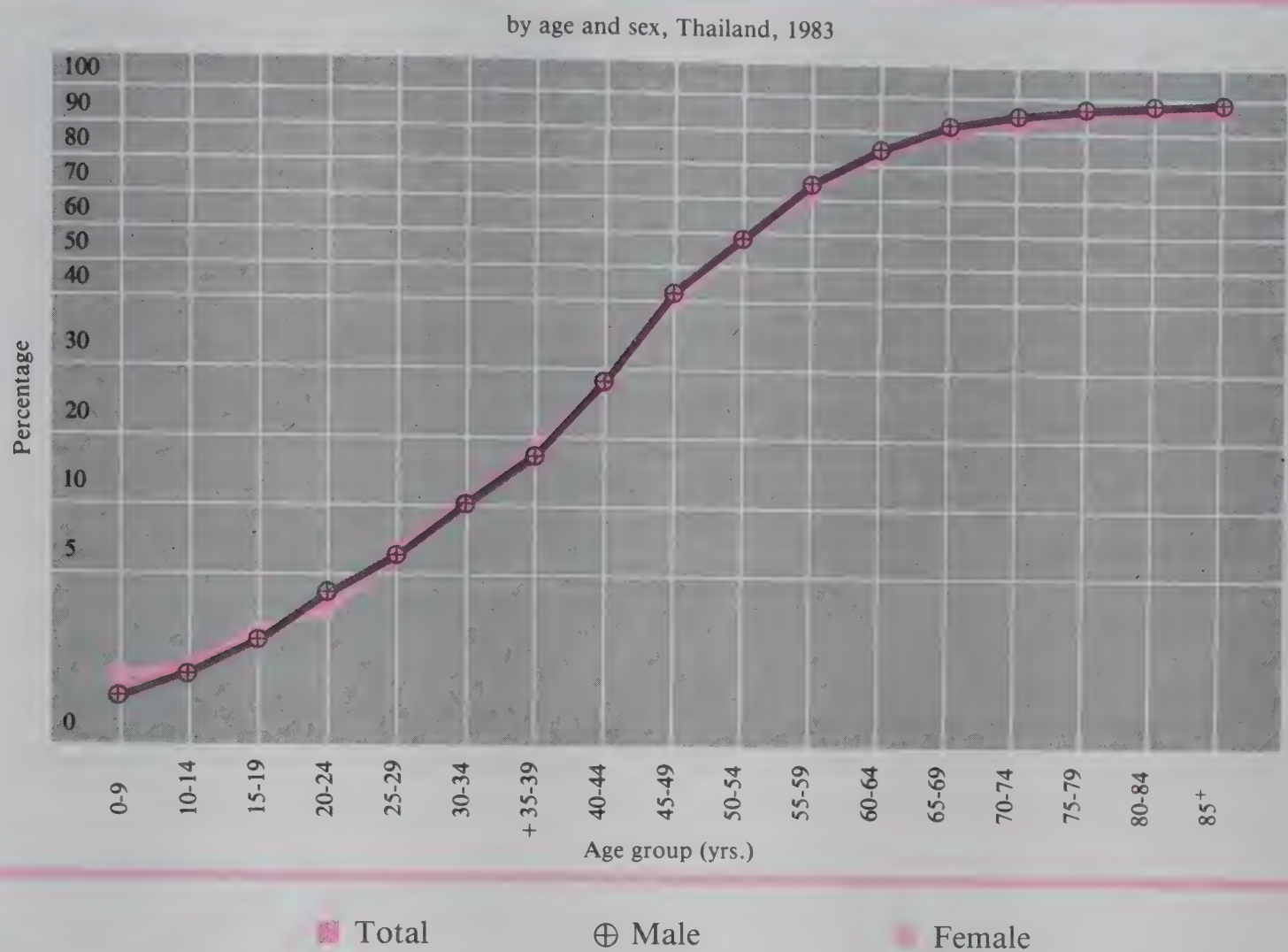
Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1981-1983

Table 3.34 Deaths and deaths rate (per 100,000 population) from chronic liver diseases and cirrhosis by sex and region, Thailand, 1979-1983

		1979		1980		1981		1982		1983	
		Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
North	T	258	2.7	290	3.0	439	4.5	415	4.2	489	4.8
	M	214	4.4	233	4.8	317	6.4	331	6.6	360	7.0
	F	44	0.9	57	1.2	122	2.5	84	1.7	129	2.6
Northeast	T	906	5.6	1252	7.6	1848	11.0	2474	14.4	2462	14.1
	M	635	7.6	854	10.4	1336	15.9	1696	19.8	1683	19.3
	F	271	3.3	398	4.8	512	6.1	778	9.1	779	8.9
Central	T	691	4.8	754	5.2	875	5.8	962	6.3	1031	6.6
	M	513	7.1	547	7.5	626	8.3	702	9.1	764	9.7
	F	178	2.5	207	2.8	249	3.3	260	3.4	267	3.4
South	T	107	1.9	118	2.1	112	1.9	142	2.4	277	4.5
	M	93	3.2	99	3.4	97	3.2	108	3.5	207	6.6
	F	14	0.5	19	0.7	15	0.5	34	1.2	70	2.3

Source : Public Health Statistics, Division of Health Statistics, Ministry of Public Health, 1979-1983

Figure 3.35 Cumulative percentage of cirrhosis by age and sex, Thailand, 1983



8. HYPERTENSION

Hypertension is the most common manifestation of the cardiovascular disease and affects most of the population in the world. From 8% to 18% of adults in many countries have blood pressure rates above 160 mmHg systolic and/or 95 mmHg diastolic (WHO Expert Committee 1978, 1983). It has been shown that hypertension is a frequent precursor of serious disorders such as stroke, coronary heart disease, congestive heart failure and renal insufficiency; all of which can result in premature death (Hatono 1976, Kannel 1972, Shea 1985). Viewed in the light of its prevalence and its possible consequences, hypertension must be regarded as one major public health problem in developing countries.

The major problem in achieving better control of hypertension in a community is that hypertension is a silent asymptomatic disease. Nearly half (42%) of the hypertensive are undetected with only a minority of known hypertensive cases being adequately treated (WHO report 1978, 1983). Screening for hypertension is needed to commence treatment at an early phase. There is strong evidence that early diagnosis and adequate treatment of hypertension reduces the morbidity and mortality of cerebrovascular accidents (Hatono 1974, Wilber 1972).

The mortality rates for hypertensive disease were between 3.6-4.2 per 100,000 during 1979-1983. A survey of hypertension in Chaiyo district in the central region of Thailand showed that the prevalence was 2.12% in 1976 (Uraiwan 1978). A recent community health survey on non-communicable diseases and their potential risk factors was performed in the subdistricts of Chonburi province (Angkasuvapala 1983). The prevalence of hypertension (blood pressure over 160/95 mmHg) was 16.7 percent in a sampled population of 1,060 aged 15 to 60 and over (Table 3.35). The magnitude of the problem appears to be increasing. Hypertension with its complications has emerged as a prominent public health problem especially afflicting men in the prime of life when their productivity, social and family responsibilities are greatest.

Table 3.35 Morbidity and mortality rate of hypertension and coronary heart diseases among the Thai population

Study area	Study pop.	Sample size	Sample technique procedure	Diagnostic findings
Uraiwan et al (1978) Chaiyo District Anghong province	Adult population	Random sampling 4,915	Health interview and examination survey	- Hypertensive heart disease prevalence rate male 14/1,000, female 13/1,000 - Coronary heart disease prevalence rate male 15/1,000, female 24/1,000
Angkasuvapala et al (1983) Chonburi province	Adult 15 years and over	Purposive Sample 1,060	Health examination survey	- Hypertension prevalence rate Total 16.7% Known cases 12.6% Unknown cases 4.1%
Division of Health Statistics (1983) Whole Kingdome	Whole population	—	Death certificate	- Hypertension mortality rate Total 3.6/1,000 Male 4.1/1,000 Female 3.0/1,000 - Coronary heart disease mortality rate Total 2.0/1,000 Male 2.5/1,000 Female 1.4/1,000

9. CORONARY HEART DISEASE

Cardiovascular diseases are the leading cause of death in most European countries and in North America. Coronary heart disease alone is responsible for about one-quarter of all deaths in males and is the single most important cause of death in people under 70 years old. In Thailand, the mortality rate of coronary heart disease appears to be increasing (Division of Health Statistics 1983). Even though the level of the morbidity rates is still low, it is the twentieth leading cause of death. The adult population survey in Chaiyo district, Anghong province in 1976 found that the coronary heart disease prevalence rates were 15 per 1,000 in males and 24 per 1,000 in females (Uraiwan et al 1976). The higher prevalence rates in this survey are probably due to the increased risk of recurrent attacks among survivors of an initial infarction. The major risk factors of coronary heart disease are hypercholesterolemia, hypertension and cigarette smoking. A community control program could run effectively if a comprehensive and reliable information system was established. The epidemiological register study will be an important tool for the preventive and curative programs.

10. CEREBROVASCULAR DISEASES

10.1 Source of Information

Morbidity and mortality data are obtained from the Public Health Statistics, compiled by the Division of Health Statistics, Ministry of Public Health.

10.2 Morbidity and Mortality

In 1984, there were 9,418 cases of cerebrovascular diseases admitted to all hospitals in Thailand. The incidence (inpatients) of the diseases has increased from 12.7 per 100,000 population in 1981 to 18.7 in 1984 (Table 3.36). Since 1957, the mortality rate has been steadily increasing every year (Figure 3.36). There was, however, an exception in 1984 when the rate decreased to 11.0 per 100,000 population.

10.3 Prevalence of Stroke and Related Risks

In 1983, Viriyavejakul and his colleagues surveyed a medium size community in Bangkok to determine the prevalence of cerebrovascular diseases, hypertension and diabetes mellitus. Preliminary results showed that the prevalence of stroke in this community was 6.9 per 100,000 population. Using the WHO criteria for hypertension, namely the diastolic blood pressure of or over 95 Torr, the prevalence of hypertension in this community was 7.69%. As for diabetes mellitus, the prevalence was found to be 3.6%, using the criteria of fasting venous blood sugar level of more than 121 mg. per 100 ml. It is also of interest to note that carotid bruit was found in 15 cases, or 12.96 per 1,000 population.

10.4 Distribution of Deaths by Age and Sex

Distribution of cases by age was limited by the incompleteness of the data. Among the deaths, nearly 60% of them were in the age group of 50 years or over (Figure 3.37), and there were twice as many males as females (Figure 3.38).

10.5 Case Fatality Ratio

The immediate death, which happened within four weeks after onset, of non-embolic cerebral infarction, cerebral embolism and cerebral hemorrhage were reported to be 19.5%, 37% and 85% respectively.

Table 3.36 Inpatients and deaths from cerebrovascular diseases, Thailand, 1981-1984

Year	Inpatients			Death	
	Number	Percent*	Rate	Number	Rate
1981	6053	0.3	12.7	5182	10.9
1982	6577	0.3	13.6	5578	11.5
1983	7545	0.3	15.2	5861	11.8
1984	9418	0.4	18.7	5536	11.0

Note : *Percentage of total inpatients
Source : Division of Health Statistics, Ministry of Public Health

Figure 3.36 Mortality rate (per 100,000 population) from cerebrovascular cause, Thailand, 1957-1984

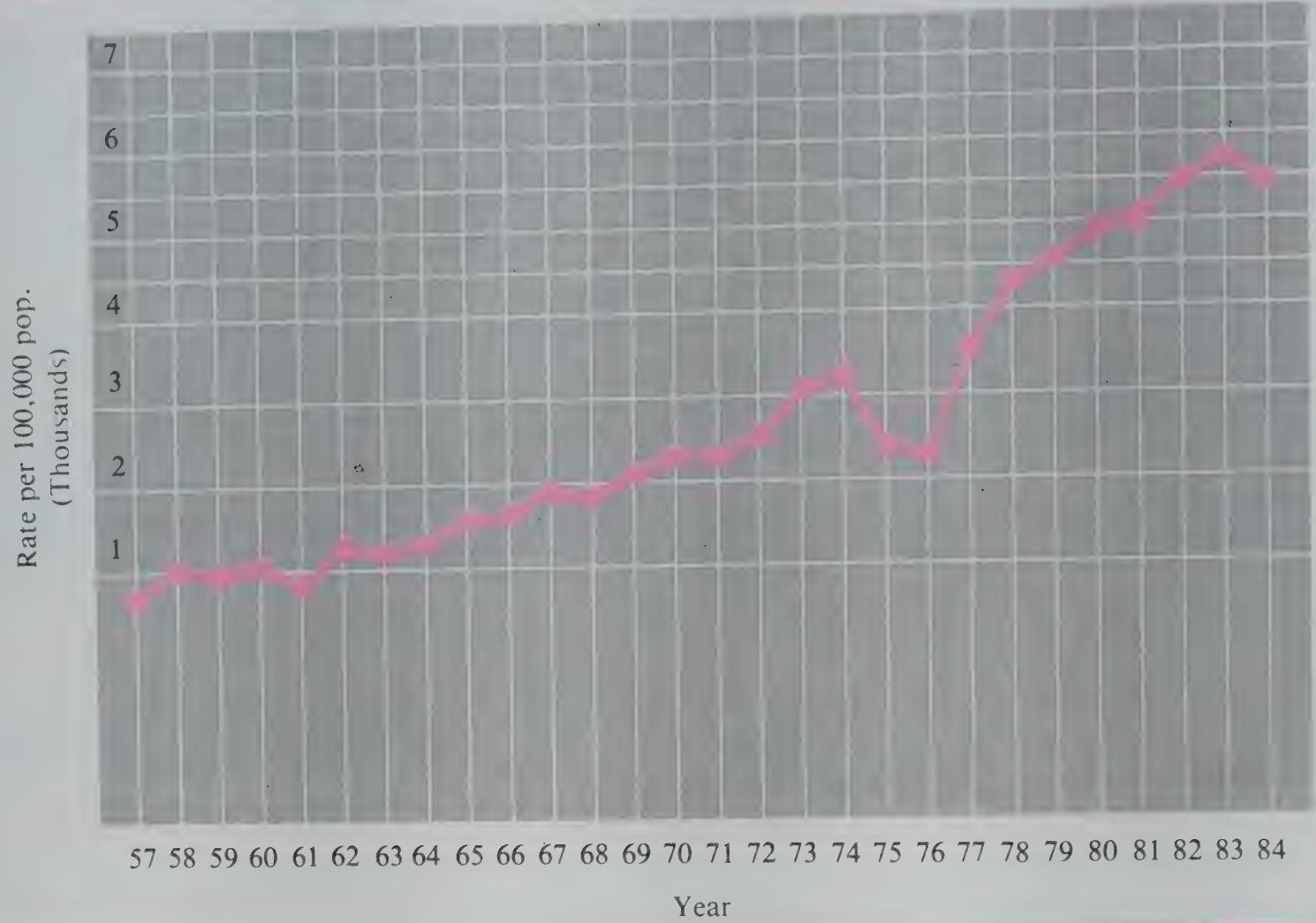
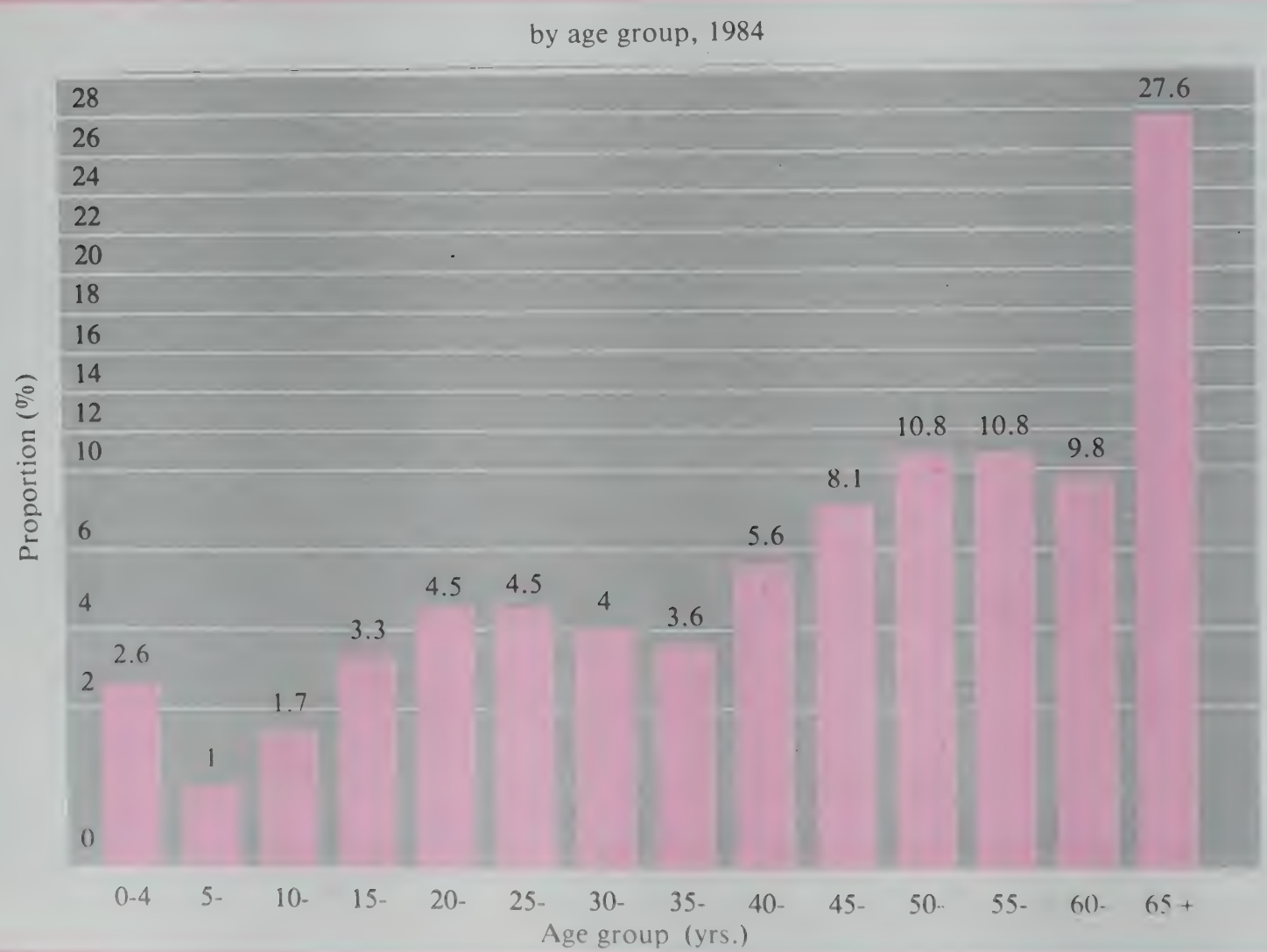
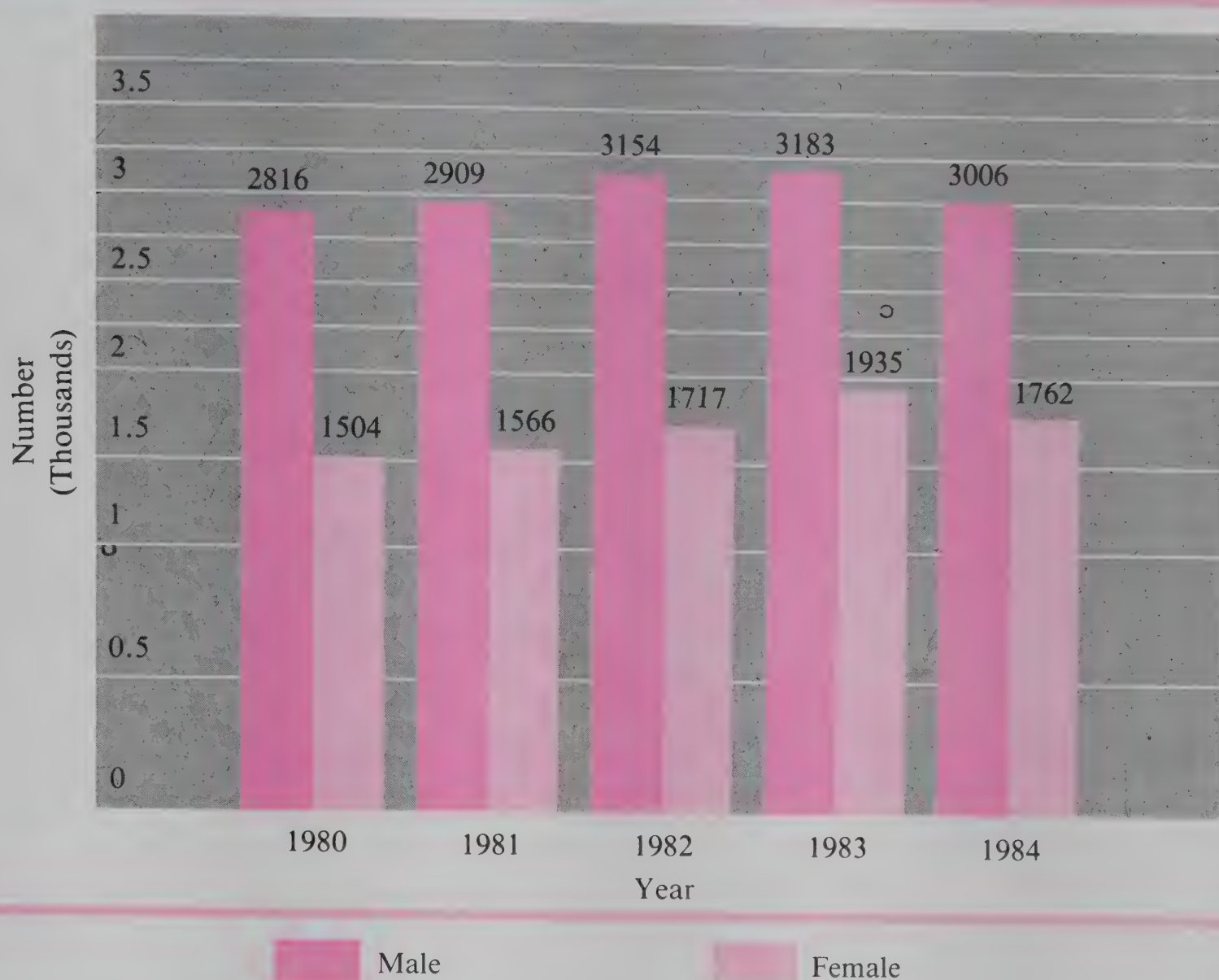


Figure 3.37 Deaths from intracranial haemorrhage by age group, 1984



Source : Division of Health Statistics 1984

Figure 3.38 Deaths from cerebrovascular causes by sex, Thailand, 1980-1984



Source : Division of Health Statistics 1984

11. COMMUNICABLE DISEASES

Communicable disease control has been one of major health activities in Thailand for decades. The following section summarizes the epidemiological situation of communicable diseases in Thailand using 1984 data from various sources. Most of the data presented here were from the surveillance network under the Division of Epidemiology, Ministry of Public Health. The figures for tuberculosis, venereal disease, malaria, and leprosy were collected from the corresponding divisions under the Department of Communicable Disease Control. Data on average hospital stay per admission were derived from the 1983 Statistical Report, Department of Medical Services.

Ranking of major communicable diseases by various parameters are presented below to review the extent and severity of this group of health problem.

11.1 General Morbidity and Mortality of Communicable Diseases

11.1.1 Morbidity

The three communicable diseases with the highest crude morbidity rate are acute diarrhea, venereal diseases, and malaria; their incidence rates were 822.17, 718.41, and 608.33 cases per 100,000 population in 1984. Hemorrhagic conjunctivitis, dengue hemorrhagic fever, influenza, pneumonia, dysentery, measles and tuberculosis are the other communicable diseases of high morbidity rate. The incidence rate for each disease is shown in Table 3.37.

11.1.2 Mortality

Malaria, pneumonia, and dengue hemorrhagic fever were the three diseases with the highest crude mortality rate of 1.27, 1.07, and 0.98 deaths per 100,000 population respectively in 1984. Acute diarrhea, tuberculosis, encephalitis, rabies, tetanus, hepatitis, and measles are the other killers shown on the ten leading communicable diseases in terms of mortality ranking.

11.1.3 Case fatality ratio (CFR)

Rabies is still the most severe communicable disease with a CFR of 100 percent. Reye's Syndrome and tetanus neonatorum are the second and the third most severe with the CFR of 58.06 and 19.50 percent respectively. The other diseases on the list of maximum CFR include encephalitis, meningococcal meningitis, purulent meningitis, leptospirosis, unspecific meningitis, diphtheria, and cholera respectively. Reference is made to Table 3.37 for CFR of the mentioned diseases.

11.1.4 Years of potential life lost (YPLL)

According to the list of ten leading communicable diseases causing maximum YPLL in 1984, dengue hemorrhagic fever is the most damaging disease causing 27,533 YPLL. Malaria and pneumonia account for 23,541 and 21,942 years respectively. Acute diarrhea, encephalitis, tetanus, rabies, tuberculosis, measles, and diphtheria are also included in the list.

Table 3.37 Ranking of leading communicable diseases by morbidity rate, mortality rate, case fatality ratio and years of potential life lost (YPLL), Thailand, 1984 (population 50,396,000)

Morbidity rate (per 100,000)		Mortality rate (per 100,000)		Case fatality ratio (percent)		YPLL (year)	
Ac. diarrhea	822.17	Malaria	1.27	Rabies	100.00	D.H.F.	27532.96
V.D.	718.41	Pneumonia	1.07	Reye's Syndrome	58.06	Malaria	23541.20
Malaria	608.33	D.H.F.	0.98	Tet. neonatorum	19.50	Pneumonia	21942.18
H. conjunctivitis	193.77	Ac. diarrhea	0.84	Encephalitis	14.30	Ac. diarrhea	16081.26
D.H.F.	137.12	T.B.	0.78	Men. meningitis	9.09	Encephalitis	11604.78
Influenza	134.37	Encephalitis	0.46	Pur. meningitis	5.26	Tetanus	9654.66
Pneumonia	126.06	Rabies	0.44	Leptospirosis	4.46	Rabies	8076.04
Dysentery	113.25	Tetanus	0.39	Uns. meningitis	4.45	T.B.	5875.86
Measles	93.67	Hepatitis	0.16	Diphtheria	4.11	Measles	3886.92
T.B.	53.14	Measles	0.14	Cholera	2.95	Diphtheria	2353.42

Source : Division of Epidemiology, Ministry of Public Health

11.1.5 Average hospital stay

The Statistical Report of the Department of Medical Services has data on inpatients admitted to its general hospitals which are all in Bangkok.

The average day of hospital stay per admission by selected communicable diseases from the 1983 report are summarized in Table 3.38. Although the figures obtained might not represent all inpatients of communicable diseases in the country, Table 3.38 still gives some idea of how disabling these diseases are.

Tuberculosis of meningitis and CNS, and tuberculosis of bones and joints are the diseases with the longest average hospital stays (50.4 and 47.0 days per admission, respectively). On the other hand, if tuberculosis of all organs are grouped as a single entity, the average hospital stay due to tuberculosis (30.4 days) will rank third to acute rheumatic fever (38.8 days) and acute poliomyelitis (31.2 days), respectively (Table 3.38)

Table 3.38 Ranking of selected communicable diseases by average hospital stay (days), Thailand, 1983

Tuberculosis meningitis and CNS	50.4
Tuberculosis bones and joints	47.0
Acute rheumatic fever	38.8
Acute poliomyelitis	31.2
Tuberculosis,all	30.4
Tuberculosis, pulmonary	27.0
Tetanus	26.0
Meningitis	25.7
Tuberculosis,intestine, peritoneum and mesenteric glands	23.6
Diphtheria	23.3
Syphilis	20.8
Venereal Diseases,all	18.3
Shigellosis	13.8
Ancylostomiasis and necatoriasis	12.0
Pneumonia	12.0
Amoebiasis	11.4
Viral hepatitis	10.4
Measles	9.4
Malaria	8.8
Typhoid fever	8.2
Whooping cough	7.5
Acute bronchitis and bronchitis	6.6
Conjunctivitis	6.0
Influenza	4.4

Source : Department of Medical Services, Ministry of Public Health

11.2 Morbidity by Age Group

Lists of the ten leading communicable diseases in terms of maximum reported morbidity in specified age groups are presented in Table 3.39.

Generally speaking, the diseases that appeared constantly on the list of every age groups are acute diarrhea, hemorrhagic conjunctivitis, influenza, malaria, dysentery, and pneumonia. Diseases found only on the lists for children age groups (less than 1 year, 1-4 years, and 5-14 years) are measles, dengue hemorrhagic fever, pertussis, and tetanus.

Malaria and venereal diseases are in top position only in adult age groups (15-34 years and 35-64 years). Diseases found exclusively on the list for adult and aging population (15-34 years, 35-64 years, and 65 years and over) are venereal diseases, hepatitis, tuberculosis and leprosy. Lastly, there are two diseases that get high rankings on the lists for children and the aging population, i.e. pneumonia and dysentery. The details of major diseases in this age group are as follows ;

11.2.1 Age group less than 1 year

Acute diarrhea, pneumonia, and dysentery are the top three leading communicable diseases in this age group. The incidence rate of acute diarrhea in this group (6,262/100,000 population) is also the highest rate in Table 3.39.

11.2.2 Age group 1-4 years

This children's group has acute diarrhea, pneumonia and measles as the first three diseases with maximum morbidity. The number of cases for acute diarrhea is about 4 times as many as the number for pneumonia.

11.2.3 Age group 5-14 years

This age group is the only group that acute diarrhea is second to another disease, i.e. dengue hemorrhagic fever, which has about 10% more cases than acute diarrhea. Malaria becomes the third most important cause accounting for about half as many cases as dengue hemorrhagic fever.

11.2.4 Age group 15-34 years

In young adults, acute diarrhea makes its way back to the top most rank again, followed by malaria and venereal disease. In this age group venereal disease gains its highest importance regarding total number of cases.

11.2.5 Age group 35-64 years

Acute diarrhea, malaria, and hemorrhagic conjunctivitis appear on the list as the first, second, and third rank respectively. Acute diarrhea causes about 3 times as many cases as malaria.

11.2.6 Age group 65 years and over

Tuberculosis becomes the second disease here while acute diarrhea remains at the first. Acute diarrhea gets 4.5 times as many cases as tuberculosis. Dysentery occupies the third rank in this senior citizen group.

Table 3.39 Ranking of leading communicable diseases by morbidity rate (per 100,000 population) in various age group, Thailand, 1984

Age < 1 year pop. 1,291,000		Age 1-4 years pop. 5,049,000		Age 5-14 years pop. 12,362,000	
Acute diarrhea	6262.28	Acute diarrhea	2059.64	D.H.F.	401.62
Pneumonia	970.18	Pneumonia	548.62	Acute diarrhea	370.32
Dysentery	443.38	Measles	458.82	Malaria	208.28
Measles	359.79	D.H.F.	290.33	H.conjunctivitis	168.93
H.conjunctivitis	298.68	Dysentery	276.41	Measles	136.19
Influenza	183.58	Malaria	168.35	Influenza	102.39
D.H.F.	88.46	H. conjunctivitis	161.08	Pneumonia	94.31
Malaria	82.42	Influenza	141.47	Dysentery	53.69
Pertussis	45.78	Chickenpox	30.82	Enteric fever	46.09
Tetanus	44.93	Pertussis	25.33	Chickenpox	35.63
Age 15-34 years pop. 19,019,000		Age 35-64 years pop. 11,023,000		Age 65 years and over pop. 1,652,000	
Acute diarrhea	472.92	Acute diarrhea	656.06	Acute diarrhea	1216.46
Malaria	408.84	Malaria	218.12	Tuberculosis	271.67
Venereal Diseases	231.40	H.conjunctivitis	181.99	Dysentery	164.10
H.conjunctivitis	221.09	Influenza	147.75	Pneumonia	149.15
Influenza	140.96	Dysentery	115.09	H. conjunctivitis	141.28
Dysentery	79.87	Tuberculosis	107.42	Influenza	140.13
Hepatitis	39.17	Pneumonia	47.41	Malaria	90.92
Enteric fever	35.44	Venereal Diseases	35.13	Enteric fever	22.28
Tuberculosis	23.61	Hepatitis	24.29	Hepatitis	19.73
Pneumonia	20.49	Enteric fever	24.17	Leprosy	15.44

Source : Division of Epidemiology, Ministry of Public Health

11.3 Morbidity by Region

All regions of Thailand in 1984 showed more or less the same ranking by morbidity of certain communicable diseases - acute diarrhea, venereal diseases, and malaria are the first three leading communicable diseases in each region with very slightly different order in the southern one when compared to other regions. The other diseases included in the regional top ten list, namely influenza, hemorrhagic conjunctivitis, dengue hemorrhagic fever, dysentery, pneumonia, measles, tuberculosis, rubella, and enteric fever are also similarly ranked when comparing among regions (Table 3.40).

Table 3.40 Ranking of leading communicable diseases by morbidity rate(per 100,000 population) by region, Thailand, 1984

Central region (pop. 16,045,000)		Northern region (pop. 10,310,000)		Northeastern region (pop. 17,814,000)		Southern region (pop. 6,227,000)	
Ac. diarrhea	1010.76	Ac. diarrhea	843.18	Ac. diarrhea	619.84	Malaria	940.02
V.D.	1008.36	V.D.	742.94	V.D.	368.99	V.D.	930.29
Malaria	799.93	Malaria	658.98	Malaria	290.51	Ac. diarrhea	880.23
Influenza	157.98	H.conjunctivitis	346.09	D.H.F.	181.71	Influenza	164.01
H.conjunctivitis	153.16	Influenza	161.44	H.conjunctivitis	176.32	Pneumonia	114.28
D.H.F.	136.50	Dysentery	151.18	Pneumonia	162.23	H.conjunctivitis	107.60
Measles	131.15	Pneumonia	145.71	Dysentery	98.57	Dysentery	92.82
Dysentery	113.21	Measles	129.73	Influenza	87.07	Enteric fever	74.72
Pneumonia	77.86	D.H.F.	126.89	Measles	58.11	T.B.	43.55
Rubella	49.59	Tuberculosis	48.76	T.B.	51.32	Measles	39.12

Source : Division of Epidemiology, Ministry of Public Health

11.4 Morbidity in Special Groups of Communicable Diseases

11.4.1 Vaccine preventable diseases

Measles, tuberculosis and rubella are the top three diseases in this subgroup with reported numbers of 47,205 cases, 26,784 cases, and 9,033 cases respectively in 1984. The fourth, fifth, and sixth on the list are typhoid fever, mumps, and pertussis. Encephalitis, tetanus, diphtheria, rabies and acute poliomyelitis are the other diseases, each causing less than 2,000 cases in 1984. (Table 3.41)

Measles vaccine has been available under Thailand's Expanded Programme on Immunization since 1984 while rubella vaccine is still not available under the programme at present.

11.4.2 Food and water borne diseases

Of all 503,164 reported cases of illness due to major food and water borne diseases in 1984, acute diarrhea alone accounted for more than 80% (414,340 cases) while dysentery, second to acute diarrhea, claimed about 10% (57,076 cases). Enteric fever, hepatitis, and cholera have much lower reported morbidity. (Table 3.41)

11.4.3 Vector borne diseases

Malaria is still the number one vector borne disease in 1984 in terms of morbidity. The number of cases for malaria (306,575 cases) is 4.4 times as many as that for dengue hemorrhagic fever (69,101 cases), which is the second on the list. Both diseases are reported from all regions of Thailand while encephalitis and scrub typhus are confined to certain geographical areas. Hence, lower morbidities for encephalitis and scrub typhus are observed. (Table 3.41)

11.4.4 Other communicable diseases

This group consists of communicable diseases other than those stated above. In terms of morbidity; venereal diseases, hemorrhagic conjunctivitis, influenza, pneumonia and chickenpox and the top five diseases with a high number of cases in 1984. (Table 3.41)

Table 3.41 Ranking by morbidity rate (per 100,000 population) of vaccine preventable diseases, food and water borne diseases, vector borne diseases, and other communicable diseases, Thailand, 1984 (population 50,396,000)

Vaccine preventable diseases		Food and water borne diseases		Vector borne diseases		Other communicable diseases	
Measles	93.67	Diarrhea	822.17	Malaria	608.33	V.D.	718.41
T.B.	53.14	Dysentery	113.25	D.H.F.	137.22	H.conjunctivitis	139.77
Rubella	17.92	Enteric fever	33.04	Encephalitis	3.21	Influenza	134.37
Typhoid	13.50	Hepatitis	28.68	Scrub typhus	0.21	Pneumonia	126.06
Mumps	11.18	Cholera	1.28			Chickenpox	14.63
Pertussis	8.06					Leprosy	6.99
Encephalitis	3.21					Trichinosis	0.36
Tetanus	2.90					Leptospirosis	0.22
Diphtheria	2.03					Men. meningitis	0.13
Rabies	0.44					Anthrax	0.04
Poliomyelitis	0.16						

Source : Division of Epidemiology, Ministry of Public Health

11.5 Communicable Diseases That Need Special Attention

Some diseases do not have adequate data available through routine reporting systems, but are of great current concern. There are also some diseases for which interventions are being undertaken, but of which magnitudes are still of importance. These will be discussed separately as the group of communicable diseases that need special attention.

11.5.1 Acute respiratory tract infection (ARI)

ARI is a group of diseases that has been recognized as one of major health hazards, especially to children, for which substantial intervention has been encouraged by WHO and other concerned authorities. ARI includes a wide spectrum of illnesses caused by numerous etiologic agents to various anatomical sites of the respiratory tracts. Unfortunately, data on this group of diseases are far from adequate. Only influenza, measles, diphtheria, pertussis and pneumonia are reported under routine disease surveillance; other certain clinical entities are reported non-systematically in hospital records.

From surveillance data, the combined morbidity from influenza, measles, diphtheria, pertussis and pneumonia total 183,532 in 1984 - second only to acute diarrhea. The main contributor to ARI mortality is pneumonia. Combined mortality of the five diseases brings this group of diseases to the top of the list for causes of deaths. ARI contribution to morbidity and mortality stands out more remarkably in children under 5 years.

Especially for infants, pneumonia alone has consistently been the most common cause of infant death. In terms of YPLL, ARI ranks first among the notifiable diseases.

11.5.2 Acute diarrhea

Acute diarrhea is being increasingly reported. Compared with other communicable diseases, acute diarrhea has the highest case rate. Surveys in 1985 and 1986 by the Division of General Communicable Diseases, Department of Communicable Disease Control, show that children under 5 years of age are experiencing diarrhea at an average frequency of 2.62 and 1.92 episodes per child per year respectively. Acute diarrhea exerts its effect particularly among small children. Infant diarrhea constitutes 20 percent of all diarrhea cases, and 44 percent of diarrhea patients are below 5 years old.

In terms of severity of illness, the diarrhea case-fatality ratio for all ages does not approach the top ten communicable diseases with high fatality. But because of the extent of its occurrence, the average diarrhea death rate ranks fourth among all communicable diseases. Severity of diarrhea is more prominent in extreme ages. The case-fatality ratio is 0.35 percent for age 65 and over on the one side, and 0.14 percent for age 0-4 years on the other side. Sixty percent of diarrhea deaths in children under 5 years is attributable to infant diarrhea. This renders diarrhea the second most common cause of infant deaths.

Occurrence of diarrhea does not differ much among different regions of Thailand, although the incidence in the central region has been a little higher than those of other regions. A bimodal seasonal pattern is found, with peak incidences in January and June. The peak occurrences are probably related to epidemics of viral diarrhea, as bacteria isolation from diarrheal stool specimens is relatively low during both periods (Bamrasnaradura Hospital 1984).

The isolation rate of pathologic bacteria from diarrheal stool ranges from 12 to 40 percent. The most common isolates are salmonella, shigella, *E. coli*, *Vibrio cholera* and *Vibrio parahaemolyticus* (Bamrasnaradura Hospital 1984). The main etiologic agent of diarrhea, especially in young ages are viruses, of which rotavirus has received the greatest concern (Jayavasv 1986, Thongkrajai 1986).

Apart from such measurable impact as death, diarrhea, if prolonged or repeated, subjects the patients to hazards of malnutrition that eventually hampers physical and brain growth; effects which are not easily measured. The economic impact from diarrhea, though seemingly of great, is yet to be assessed.

Studies have identified family income, maternal education, weight of infants, birth order, parental beliefs and attitudes toward the causation, disease outcomes, and proper treatments as contributing factors to the morbidity and mortality of diarrhea. However, information on socio-behavioral aspects of diarrhea is still inadequate.

Diarrhea control consists of prevention of morbidity and mortality. For morbidity prevention, major efforts have been allocated to provision of safe and adequate water supply. Promotion of breast-feeding and proper weaning, and health education for personal hygiene including use of latrine are undertaken as supplementary measures. For mortality prevention, the use of oral rehydration therapy has been employed as the principal intervention.

11.5.3 Hepatitis B

According to the current disease surveillance network, hepatitis cases are reported to the Ministry of Public Health in four separate categories; hepatitis A, hepatitis B, Non-A Non-B hepatitis, and unspecified hepatitis. Due to the shortage of laboratory diagnostic support, most of the diagnoses are made on a clinical basis. As a result, almost 80 percent of the cases are reported as unspecified hepatitis and less than 1 percent as hepatitis B (Table 3.42).

Table 3.42 Reported cases of hepatitis by type, Thailand, 1980-1984

Type	1980	1981	1982	1983	1984	ToTal	
						Number	Percent
Hepatitis A	2683	2464	2785	2764	1876	12572	22.03
Hepatitis B	67	67	—	59	250	443	0.78
Non A, Non B	—	—	—	22	94	116	0.20
Hepatitis Unspecified	9954	6918	6318	8517	12233	43940	76.99
Total	12704	9449	9103	11362	14453	57071	100.00

Source : Division of Epidemiology, Ministry of Public Health

11.5.3.1 Prevalence of hepatitis B (HBV) infection in Thai population

Prevalence of HBV infection, as shown by the combinations of HBV markers, has been determined in several studies. Average infection rates are shown to range from 37 to 52 percent (Table 3.43). The infection rates rise rapidly with age - at age 10, about 30 percent of the population have been infected; when they reach age 40, the infection rates have come up to 44 to 67 percent. Only small proportions of people aged 60 or more have escaped the infection.

11.5.3.2 Prevalence of HBsAg carrier state in Thai population

Prevalence surveys have shown that the average HBsAg carrier rate in the Thai population ranges between 7-11 percent. There seems to be no significant variation in HBsAg carriage between urban and rural areas, and among different geographical areas (Table 3.44).

Table 3.43 Age-specific prevalence (percent) of HBV infection in three Thai populations

Age-group	Huay Kwang Bangkok (1)	Khao Yai Nat. Park (2)	Tab Lan Prachinburi (3)
0-4	21.2	19.3	11.4
5-9	31.5	22.4	28.9
10-14	42.3	38.4	43.8
15-19	60.3	31.4	50.0
20-29	62.5	44.0	52.9
30-39	66.7	44.0	54.1
40+	67.7	45.7	67.4
All ages	51.8	37.1	38.4
Total number tested	523	485	737

Note : Combined prevalence of HBsAg and AntiHBs

Source : 1. Grossman et al 1975 2. Snitbhan et al 1976 3. Scott et al 1977

Table 3.44 Prevalence of HBsAg in the general Thai population

Population	Lab. Method	No. Tested	Prevalence (%)
Huay Kwang Bangkok (Urban) 1	RIA	687	9.0
Khao Yai (Rural) 2	RIA	484	10.1
Tab Lan Prachinburi (Rural) 3	RIA	736	7.2
San Kampaeng Chiangmai (Rural) 4	IEOP	116	8.6
Ayudhaya, Chacherngsao, Ubonrachathani, Chiangmai (Rural) 5	CF, ID	1572	10.9

Note : RIA = Radioimmuno assay
 IEOP = Immuno-electro osmophoresis
 CF = Complement fixation
 ID = Immunodiffusion

Source : 1. Scott et al 1973 2. Snitbhan et al 1975 3. Scott et al 1977 4. Snitbhan et al 1975 5. Punyagupta et al 1973

Prevalence of HBsAg carriage was determined in medical and nursing students (Chainuvati et al 1980), prostitutes (Scott 1972), prisoners (Urwijitaroon 1982), and drug addicts (Department of Medical Sciences 1985); however, these groups of people seem to have no higher carrier rates than the general population (Table 3.45).

Based on these data, 4 to 5 million of Thai people are estimated to be carrying HBsAg. The carrier rate increases with age and reaches its highest level of about 8 to 10 percent between ages 5 and 15 years; the rate remains at this level through adulthood. However, the antigenicity slightly declines after age 40 (Snitbhan et al 1975, Scott et al 1976).

11.5.3.3 Incidence of HBV infection

As a high proportion of HBV infection is asymptomatic, it is not possible to estimate the incidence of HBV infection from routine surveillance data, especially when the completeness of reporting is still a problem. However, in Bangkok (Grossman et al 1975) and Prachinburi (Scott et al 1977) the incidence, measured in terms of annual acquisition of HBV markers, is shown to range from 12 to 21 percent (Table 3.46).

Table 3.45 Prevalence of HBsAg in some high risk Thai populations

Population	Lab. Method	No. Tested	Prevalence (%)
Medical and nursing students (1)	RIA	722	9.6
Prostitutes, Bangkok (2)	RIA	681	8.1
Prisoners, Khon Kaen (3)	CI EP	472	5.1
Drug addicts, Bangkok (4)	CI EP	201	8.0

Source : (1) Chainuvati et al 1980
 (2) Scott et al 1975
 (3) Urwijitaroon 1982
 (4) DMS, MOPH 1985

Table 3.46 Incidence* of HBV infection in three Thai populations

Population	Lab. Method	No. Tested	Incidence (%)
Huay Kwang, Bangkok (1)	IBOP, RIA, PHA	252	16.9
Tab Lan, Prachinburi (2)	RIA	64	11.8
Phiboonprachasan School, Bangkok (3)	RIA	1298	21.3

*Note : *Combined acquisition of HBsAg and Anti HBs in a period of one year*

Source : (1) Grossman et al 1975
(2) Scott et al 1977
(3) Snitbhan et al 1978

11.5.3.4 Ratio of hepatitis B to overall hepatitis

An indicator that may partly reflect the magnitude of hepatitis B is the ratio of hepatitis B cases to overall hepatitis cases. Detection of HBsAg in hepatitis patients admitted to the hospital shows that hepatitis B accounts for 30 to 50 percent of hepatitis patients (Scott et al 1972 , Punyagupta et al 1973 , Thongcharoen et al 1976 , Kunanake et al 1977) (Table 3.47).

11.5.3.5 Perinatal transmission

It is well accepted that perinatal transmission of HBV from carrier mothers to their infants is the most important mode of spreading and perpetuation of hepatitis in endemic areas. At present, about 6 to 9 percent of Thai women in reproductive ages are HBsAg positive (Chiewsilp et al 1974 , Scott et al 1975) (Table 3.48). About 40 percent of these carriers, as demonstrated in other studies, are also positive for HBeAg, and thus they are considered highly infective to their babies.

With the 2.1 percent current annual birth rate in Thailand, about 1.2 million new born infants are delivered each year. Of these infants, about 72,000 to 108,000 are born to carrier mothers, and about 30,000 to 40,000 of them are estimated to become carriers through perinatal infection. Consequently, these infants will be acting as potential sources for further HBV infection in their communities.

In the wake of the morbidity, severe long term sequelae and economic loss caused by the disease, the Thai Ministry of Public Health has appointed a national "Committee for the Control of Viral Hepatitis". The committee has been working to set up a master plan for hepatitis B control on a national scale. Subcommittees have subsequently been assigned to develop protocols for concerted clinical and epidemiological studies, to render data necessary to substantiate development of the control program, to draw plans for the supply and logistics of diagnostic support, to form guidelines for management of health personnel, and to make recommendations for the public.

Table 3.47 Prevalence of HBsAg in hepatitis patients

Investigator	Lab. Method	No. Tested	Prevalence (%)
Kunanake et al 1977	CIEP	243	26.7
Thongcharoen 1976	CIEP	51	41.2
Scott 1972	RIA	113	47.8
Punyagupta 1973	CF, ID	222	50.4

Table 3.48 Prevalence of HBsAg in pregnant Thai women

Investigator	Lab. Method	No. Tested	Prevalence (%)
Chiewsilp et al 1974	IEOP, CF, RI	1625	5.7
Scott 1975	RIA	1625	7.0
	RIA	1000	9.0
Bunyaratavej 1983	?	5437	5.6

11.5.4 Intestinal helminthiasis

Although helminthiasis is a significant problem in Thailand, substantial data on helminthiasis only are available for intestinal infestations. The latest large-scale survey in 1981 (Preuksaraj et al 1982) showed that, on average 54.6 percent of the Thai people were infested with one or multiple intestinal parasites. The soil-transmitted helminths were highly prevalent in the southern region, while in the north-eastern region the prevalence of soil-transmitted helminths and of liver flukes were both noteworthy (Table 3.49). Infestation rates of liver fluke, tape worm and *Echinostome spp.* vary with age, but the age association was not found for other helminths (Table 3.50).

Severity in terms of deaths and disability from helminthiasis is inapparent, though not inestimable. The major health impact from intestinal helminthiasis is malnutrition which, in turn, brings about such long term sequelae as growth retardation, low immunity, loss of working capacity, etc. A study in Japan in 1956 (Komiya 1956) revealed a 30 percent reduction in working capacity in 10 percent of individual infected with intestinal parasites. Though the equivalent data for Thailand are not available, production loss due to helminthiasis is assumed to be considerable. Moreover, hookworm has been known as a major cause of anemia in the rural Thai population. It was estimated that an individual infected with hookworms lost as much as 436.5 ml. of blood in one year (Srinopakun and Chiradit 1978).

Currently, the Department of Communicable Disease Control has been employing the treatment of anti-helminthic drug to reduce intensity of infection as a main strategy for the control of intestinal helminthiasis. Mebendazole is used for hookworm infestation, ascariasis, enterobiasis and other soil-transmitted parasite infestations in school children; praziquantel is used for liver fluke infestation in adults. However, improvement of environmental sanitation, personal hygiene, and eating habits are being promoted as strategies for reduction of transmission.

Table 3.49 Prevalence (percent) of intestinal parasite infestations in different regions, Thailand, 1980-1981

Parasite	Prevalence			
	Central	Northern	Northeast	Southern
Hookworm	26.07	35.46	40.67	75.94
<i>Ascaris lumbricoides</i>	4.23	0.62	0.06	16.58
<i>Trichuris trichiura</i>	4.46	0.12	0.01	32.50
<i>Opisthorchis Viverini</i>	6.34	5.59	34.60	0.01
<i>Taenia spp.</i>	0.66	0.94	1.13	0.06

Source : Preuksaraj et al 1982

Table 3.50 Age-specific prevalence (percent) of intestinal helminthiasis, Thailand, 1980-1981

Parasite	Age group							All
	0-4	5-9	10-14	15-19	20-24	25-29	30 +	
Hookworm	25.00	43.00	44.00	39.00	37.00	38.00	14.00	41.00
Ascaris	5.00	6.00	5.00	4.00	3.00	4.00	2.00	4.00
Trichuris	5.00	8.00	8.00	6.00	6.00	5.00	6.00	6.00
Enterobias	0.40	0.50	0.40	0.10	0.10	0.30	0.30	0.30
Strongyloides	0.20	0.30	0.40	0.70	0.40	0.60	0.50	0.40
Liver fluke	2.00	6.00	12.00	18.00	20.00	20.00	20.00	15.00
<i>Heterophyte spp.</i>	0.10	0.20	0.30	0.30	0.70	0.90	0.50	0.40
<i>Echinostome spp.</i>	0.10	0.10	0.30	0.40	0.60	0.80	0.70	0.50
<i>H. nana</i>	0.02	0.20	0.30	0.40	0.10	0.04	0.10	0.10
<i>Taenia spp.</i>	0.02	0.20	0.20	0.70	0.70	1.00	1.00	0.80
Multiple	5.00	12.00	13.00	12.00	12.00	12.00	14.00	12.00

Source : Preuksaraj et al. 1982

11.5.5 Visceral leishmaniasis

11.5.5.1 Cases reported

The first case of visceral leishmaniasis (Kala-azar) in Thailand was reported in 1958 (Prabha and Song 1960). The patient came from East Pakistan which is an endemic area for this disease. In October 1985, the first Thai case of Kala-azar was diagnosed. He had worked in a middle east country before he contracted the disease. Up to the present time, there is a total of five reported cases ; all are male workers who were working in the Middle-East prior to the onset of the illness (Division of Epidemiology 1985-1987). None has died. Individual case investigation showed that these cases were infected while they were overseas.

11.5.5.2 Problem of delayed diagnosis

Because of the chronic disease pattern with long incubation period of about 3-8 months, the definite diagnosis was often delayed. Most physicians have no experience with Kala-azar and always neglect the history of working abroad. Besides, there are endemic diseases such as malaria, that present similar signs and symptoms. All of the five cases had spent much time seeking medical care, from 3 to 18 months after onset. Four cases were diagnosed by the demonstration of *Leishmania donovan* bodies from bone-marrow smears and one case was positive from the culture. Diagnostic services and specific treatment are available only in some large hospitals.

11.5.5.3 Future concerns

It is known that there is a wide spectrum of leishmania reservoirs; including dogs, foxes and rodents. Recent studies show that phlebotomus sand-flies exists in Thailand, but whether the species are capable of parasite transmission is now under study.

During the past decade, more than 200,000 Thai workers went to the Middle-East (Department of Labour, Ministry of Interior). This trend will persist for the near future. These workers are at risk of Kala-azar. It is expected that more cases of Kala-azar among these workers may be found as health authorities become more aware of the disease. Moreover, the possibility of local transmission in Thailand is to be meticulously examined, as the occurrence of newly established foci of endemic Kala-azar has been demonstrated in Kenya (Ho et al 1982)

11.5.5.4 Study need

Workers going to and returning from the Middle-East should be educated about the disease. It is important to continue the surveillance for cases and vectors, especially among the workers returning home and in their village environment.

11.5.6 Acquired immunodeficiency syndrome (AIDS)

11.5.6.1 Case report

In Thailand, the first case of AIDS was reported on September 27, 1984 three years after the detection of this disease in United States of America and Europe. Up to October, 1986, five more AIDS cases, sixteen AIDS related complexes (ARC) and nine asymptomatic carriers were detected (Division of Epidemiology, personal communication).

Among six male AIDS cases, four were foreigners, the others were Thai. All are already dead. The first Thai case was a homosexual; he had been studying in USA and had many American partners. The second was a bisexual. He had never been abroad, but had one foreign homosexual partner who came to see him every two or three months for many years.

Among the sixteen ARC cases, 15 were male. Twelve were foreigners, 4 were Thai. One Thai ARC case was the wife of the second Thai AIDS case.

Asymptomatic carriers are more likely to spread the disease. Without serological examination, they do not differ from the general population. The total number of asymptomatic carriers is not known, however, the average incidence of seropositives among the high risk population (i.e. homosexual/bisexual men, female prostitutes, persons who received blood transfusions and intravenous drug abusers) in four seroepidemiological surveys conducted in Bangkok and Pattaya ranged from 0.6 to 2.4 percent (Table 3.51).

11.5.6.2 Pattern of spread

AIDS in Thailand began with imported cases and spreaded to the homosexual group. Up to now, there is no evidence of heterosexual transmission. This pattern is similar to what occurred in USA ten years ago.

11.5.6.3 Future trend

Approximately 3.5 million tourists visit Thailand each year. Many of them come from European countries and the USA where AIDS is endemic. There might be many Thai homosexuals and prostitutes who have sexual contact with those seropositive tourists. Thus, the AIDS problem in Thailand will increase.

At the present time, there is sufficient knowledge and facilities to diagnose this disease. It is important to strengthen the surveillance, to educate the high risk group, and to plan to cope with this emerging problem.

Table 3.51 Seroepidemiological surveys for HIV antibodies, conducted in Thailand, 1985-1986

Survey	Year	Risk groups	Pos. rate (%)	Researcher
1	April, 1985	Homosexual, Female prostitutes	2.36	David Tayler
2	June, 1985	Homosexual, Female prostitutes Drug abusers, Blood donors, blood recipients Normal heterosexual men	0.90	Yongyoot Wangroongsarb
3	October, 1985 to January, 1986	Homosexual, Female prostitutes Heterosexual men	0.80	Amnuay Traisupa
4	April-May, 1986	Homosexual, Female prostitutes	0.56	Amnuay Traisupa

Source: A Trisupa, Division of Venereal Disease Control, Department of Communicable Disease, Ministry of Public Health

CHAPTER 4

PRIORITY SETTING

1. PRIORITY SETTING

Priority setting of health problems is an important step for the more effective allocation of resources. When priorities are established at different levels of administration and among different agencies with competing interests, each gives different weight to the elements on which decisions are made. Statement on priorities are often inconsistent, and sometimes incompatible. The setting of priorities requires judgement, knowledge, and wisdom, and an ability to synthesize numerous details across different dimension.

One approach to effective health care delivery would be the identification of a limited number of priority health problems which are more severe, or affect significantly large numbers of people, and for which feasible cost-effective control measures exist. There should be health care interventions which promise to have the highest impact on reducing morbidity and mortality. These selected interventions would be integrated with one another to reduce duplication of effort and to increase accessibility of care.

The present procedure for selecting priority health problems was modified from the WHO priority setting method (Appendix A2). Parameters for priority setting are classified into three categories - (1) parameters for disease magnitude, (2) parameter for disability, and (3) parameter for treatability.

Based on disease magnitude, the parameters include morbidity rate, mortality rate, case-fatality ratio (CFR), years of potential life lost, and average hospital stay.

Parameters which had detailed and complete information were categorized into five rating scales. A score of 5 signifies high importance. The criteria for the rating are as follows:

Parameters	Rating Score				
	1	2	3	4	5
Morbidity rate (/100,000)	0-9	10-49	50-99	100-499	500 +
Mortality rate (/100,000)	◀1	1-4	5-9	10-19	20 +
CFR (%)	0-4	5-9	10-19	20-49	50 +
Disability	none	mild	moderate	less severe	severe
YPLL (year)	◀1,000	1,000-4,999	5,000-19,999	20,000-49,999	50,000 +
Hospital stay (week)	◀1	1	2	3	4 +

For some diseases, the scoring for some parameters was not possible because of inadequate data. In such cases, the investigators used their judgement based on their experience and experts' advice to select the suitable weight. The scores in parenthesis in Tables 4.1-4.3 indicate that they were selected on a judgemental basis.

For disability parameters which had not been documented, the investigators assigned scores from 1 to 5 according to the degree of disability after discharge from the hospital. The assignment was based subjectively on experience and advice.

For the parameters of preventability and treatability, the rating was scored as low, medium or high according to the ability to prevent or treat the diseases. The assignment was based also on experience and advice.

After all parameters were scored for all health problems, the overall importance for each health problem was then established. The values of morbidity, mortality, disability, and years of potential life lost were combined into a total score to be used in combination with preventability and treatability in ranking.

However, the average length of hospital stay and CFR were not included in the calculation of the total score. Both were gathered from data compiled for selected hospitals which were not totally representative of the whole country's hospitals. Moreover, the routine hospital record keeping of length of admission and CFR did not include many diseases. Hospital stay and CFR were thus deemed inappropriate to be used in the ranking procedure.

It should be noted here that statistics for some diseases were not as current as others. Most data were from 1983 while the most recent ones were from 1986. Comparison of the rates from different years should be done with caution. However, since all parameters were finally scored from 1 to 5 or from low to high, the discrepancy would minimally affect the results of priority setting.

2. RESULT

2.1 Priority Setting Based on Magnitude of the Diseases

The disease ranking according to the total score value without taking into account the preventability and treatability are shown in Table 4.1. The diseases of the highest priority (i.e., had the highest scores) include:

- traffic accidents
- cancer
- stroke
- assault
- homicide
- cirrhosis of liver
- malaria

2.2 Priority Setting Based on Preventability Criteria

When the criteria of preventability was considered, only six diseases were rated as highly preventable. These are mostly vaccine-related diseases such as, tetanus, poliomyelitis, measles, diphtheria, rabies and rubella. The diseases with high scores of incidence or mortality such as cancer or cirrhosis were in the low preventability group as shown in Table 4.2.

2.3 Priority Setting Based on Treatability Criteria

Another point of view in looking at the importance of the problem diseases is by the treatability criterion. This component was judged by the current treatment status of each diseases in Thailand. Based on this criterion, 17 diseases were in the high treatability group. Some also had high scores in magnitude and severity, and include malaria, pneumonia, dengue hemorrhagic fever, and acute diarrhea (Table 4.3).

In summary, when the magnitude of severity and the economic loss criteria were taken into account, traffic accidents, cancer, stroke, assault and homicide, cirrhosis of liver, malaria, mental illness, peptic ulcer, pneumonia, suicide and attempted suicide, and acute diarrhea were considered high priority diseases. In terms of selecting priorities based on the ability to prevent them, these diseases were of high priority: tetanus, poliomyelitis, measles, diphtheria, rabies and rubella. If the treatability criterion was used alone, many more diseases would have high priorities; some infectious diseases would be included.

Besides priority diseases based on the previously discussed criteria, it might be equally important to pay attention also to the growing problems in the near future; namely, hepatitis B and AIDS. Even though at the present time, due to problems of diagnosis or case finding, the extent of these diseases is not clear but trends and the social situations have indicated that it would be worthwhile to take them into consideration.

Table 4.1 Ranking of diseases according to the total score value

Rank	Diseases	Criteria					Other Criteria			
		Morbidity rate Incidence Preval. (1-5) (/100,000)	Mortality Rate (1-5)	Disabi- lity (1-5)	YPLL (1-5)	Total Score (4-16)	CFR (1-5)	Av. Hosp Stay (1-5)	Prevent- ability (H-M-L)	Treat- ability (H-M-L)
1	Traffic accident	4	4	3	5	16	2	(3)	M	M
2	Cancer	2	4	4	5	15	(4)	3	L	L
3	Stroke	2	4	4	5	15	4	5	M	L
4	Assult & Homicide	2	4	3	5	14	5	(3)	L	L
5	Cirrhosis	1	3	3	5	12	3	3	L	L
6	Malaria	4	2	2	4	12	1	2	M	H
7	Mental Illness	4	2	4	(1)	11	1	5	M	L
8	Peptic Ulcer	4	(3)	1	(3)	11	1	2	M	M
9	Pneumonia	4	2	1	4	11	1	2	L	H
10	Suicide & Attempted	1	3	2	5	11	5	(1)	M	L
11	Acute Diarrhea	5	1	1	3	10	1	(1)	M	H
12	Coronary Heart Diseases	3	2	3	(2)	10	3	2	M	L
13	Dengue Haemorrhagic	4	1	1	4	10	1	(1)	M	H
14	Dibetes mellitus	(2)	3	2	(3)	10	2	4	L	M
15	Hypertension	4	2	2	(2)	10	2	2	M	M
16	Occupational Accident	3	1	3	3	10	1	(2)	M	M
17	Drowning	(1)	2	1	5	9	(5)	(1)	M	L
18	Encephalitis	1	1	4	3	9	3	(4)	M	L
19	Tuberculosis	3	1	2	3	9	1	5	M	H
20	Drug Addiction	(2)	(1)	3	(2)	8	(1)	(5)	M	L
21	Dysentery	4	1	1	2	8	1	(1)	M	H
22	Venereal Disease	5	1	1	1	8	1	3	M	H
23	Conjunctivitis	4	1	1	1	7	1	1	L	H
24	Influenza	4	1	1	1	7	1	1	L	H
25	Leprosy	1	1	4	(1)	7	1	(1)	M	M
26	Measles	3	1	1	(2)	7	1	2	H	H
27	Poliomyelitis	1	1	1	1	7	1	5	H	M
28	Tetanus	1	1	2	3	7	3	(3)	H	M
29	Appendicitis	3	(1)	1	(1)	6	1	1	L	H
30	Diphtheria	1	1	2	2	6	1	4	H	M
31	Hepatitis A	2	1	1	2	6	1	2	L	H
32	Intest Obstr & Hernia	2	(1)	1	(2)	6	1	2	L	H
33	Rabies	1	1	1	3	6	5	(1)	H	M
34	Enteric fever	2	1	1	1	5	1	(2)	M	H
35	Rubella	2	1	1	1	5	1	1	H	H
36	Typhoid	2	1	1	1	5	1	2	M	H
37	Cholera	1	1	1	1	4	1	2	L	H
38	Pertussis	1	1	1	1	4	1	2	M	M

Table 4.2 Ranking of diseases according to their preventability and treatability

Rank	Disease	Total Score (4-16)	Preventability (H-M-L)	Disease	Total score (4-16)	Treatability (H-M-L)
1	Tetanus	7	H	Malaria	12	H
2	Poliomyelitis	7	H	Pneumonia	11	H
3	Measles	7	H	Dengue Haemorrhagic	10	H
4	Diphtheria	6	H	Acute Diarrhea	10	H
5	Rabies	6	H	Tuberculosis	9	H
6	Rubella	5	H	Venereal Diseases	9	H
7	Traffic Accident	16	M	Dysentary	8	H
8	Stroke	15	M	Conjunctivitis	7	H
9	Malaria	12	M	Influenza	7	H
10	Peptic Ulcer	11	M	Measles	7	H
11	Suicide & Attempted	11	M	Appendicitis	6	H
12	Mental Illness	11	M	Hepatitis A	6	H
13	Coronary Heart Diseases	10	M	Intest Obstr & Hernia	6	H
14	Dengue Haemorrhagic	10	M	Enteric Fever	5	H
15	Occupational Accident	10	M	Rubella	5	H
16	Acute Diarrhea	10	M	Typhoid	5	H
17	Hypertension	10	M	Cholera	4	H
18	Drowning	9	M	Traffic Accident	16	M
19	Encephalitis	9	M	Peptic Ulcer	11	M
20	Tuberculosis	9	M	Diabetes Mellitus	10	M
21	Drug Addiction	8	M	Hypertension	10	M
22	Dysentery	8	M	Occupational Accident	10	M
23	Venereal Disease	8	M	Leprosy	7	M
24	Leprosy	7	M	Poliomyelitis	7	M
25	Typhoid	7	M	Tetanus	7	M
26	Enteric Fever	5	M	Diphtheria	6	M
27	Pertussis	4	M	Pertussis	4	M
28	Cancer	15	L	Cancer	15	L
29	Assault & Homicide	14	L	Stroke	15	L
30	Cirrhosis	12	L	Assult & Homicide	14	L
31	Pneumonia	11	L	Cirrhosis	12	L
32	Diabetes mellitus	10	L	Mental Illness	11	L
33	Conjunctivitis	7	L	Suicide & Attempted	11	L
34	Influenza	7	L	Coronary Heart Diseases	10	L
35	Intest Obstr & Hernia	6	L	Drowning	9	L
36	Appendicitis	6	L	Encephalitis	9	L
37	Hepatitis A	6	L	Drug Addiction	8	L
38	Cholera	4	L	Rabies	6	L

CHAPTER 5

CONCLUSION AND RECOMMENDATION

The analysis of the past and present situation of health problems in Thailand, including the perception of future trends, has shown that although many infectious diseases are declining in their severity, as measured by the case fatality rates and the mortality rates, the incidence of some diseases, such as diarrheal diseases, venereal diseases, acute respiratory tract infections, etc., are increasing. On the contrary, the morbidity and mortality of some infectious diseases are on the decline especially in the group of vaccine-preventable diseases, with the exception of pertussis.

For the non-communicable diseases, the trends are on the increase for both morbidity and mortality. The major problems are accidents, assault and homicide, cancer, stroke, and heart diseases. As a result of their increase in magnitude and severity, chronic disease problems are superimposed by tremendous economic loss, measured roughly by the long average length of hospital stay and the extended years of potential life lost (YPLL) without taking social and family problems into consideration. This group of diseases at the present time are not readily preventable or treatable, thus adding more significance to them.

At the same time, the focus is also on the diseases which may well be the major problems in the near future; they are Acquired Immune Deficiency Syndrome (AIDS) and visceral leishmaniasis. Because of their contagious nature along with the change in socio-demographic and cultural norms, the spread of these infections among the population may be enhanced.

Based on the current status of the country's health problems, the following recommendations are proposed with the emphasis on several research areas in order to help alleviate the problems.

1. CONTROL OF MAJOR HEALTH PROBLEMS

There are urgent needs to study in depth about the risk factors and the effective prevention or control measures for the following diseases:

1.1 The group of diseases with high priorities.

These rank high in magnitude, severity and economic loss. The 10 leading diseases in the priority setting list are traffic accidents, cancer, stroke, assault and homicide, cirrhosis, malaria, mental illness, peptic ulcer, pneumonia, and suicide and attempted suicide.

1.2 The diseases which do not score high on the priority scale but are current problems.

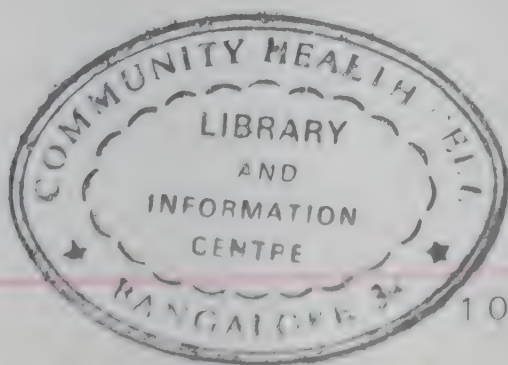
These are health problems of high importance but for which there are incomplete or no available data through the routine disease reporting system. This group may include hepatitis B, acute respiratory tract infections, parasitic infections, nutritional deficiencies, and others.

1.3 The future disease problems: AIDS and visceral leishmaniasis.

As stated above, they are expected to become potential problems due to their contagiousness and the lack of preventive measures to decrease the risk in the population.

1.4 The vaccine preventable diseases.

Since the magnitude and severity of these diseases have markedly declined due to the implementation of immunization, it may well be time to expect the eradication of certain diseases within this group. The more promising ones are poliomyelitis, neonatal tetanus and diphtheria.



11/11/11

2. IDENTIFICATION AND INTERVENTION OF HEALTH RISK BEHAVIOR

2.1 Due to the rising trends in morbidity and mortality of many non-communicable diseases which have tremendous impact on the economic and social burdens of the country, efforts should be made on the prevention of the diseases rather than on treatment alone. Epidemiological studies of the risk factors for various diseases, such as common cancer for males and females, stroke, traffic accidents, and others should be encouraged along with the study of behaviors or life styles of the Thai people in various parts of the country in connection with the risk of disease development.

2.2 In depth studies to understand people's perception of health and diseases which can subsequently lead to changes in poor or risky health behavior are needed.

2.3 Intervention studies are needed to identify effective methods of health education aiming at changing human behavior.

3. IMPROVEMENT OF THE HEALTH INFORMATION SYSTEM

During the process of data collection for health situation analysis, the Commission came across much evidence that leads to questions about the quality of the data especially in relation to completeness and validity. In order to improve the health information system and keep up with the current health status, research in the following areas are suggested.

3.1 Periodic health surveys to solve the immediate shortage for health and disease-related data are recommended.

3.2 Further improvement of the existing disease surveillance system is needed. This should include the development of non-communicable disease registration system, the cooperation and collaboration between the Department of Medical Services and the Division of Epidemiology.

3.3 There is a need to explore the feasibility of developing a Record Linkage System which is ideal for the study of continuing health problems and for conducting other epidemiological research.

4. MULTIDISCIPLINARY COLLABORATION

The Commission strongly recommends the need for joint participation among scientists of many disciplines and health administrators. In order to solve and prevent current and future problems, research must be done broadly and in depth by multidisciplinary collaboration among epidemiologists, physicians, social scientists, economists, anthropologists, and interested health administrators to achieve successful and rewarding results.

APPENDIX A1

YEARS OF POTENTIAL LIFE LOST

Year of potential life lost (YPLL) is defined as the number of years of potential life lost by each death occurring before a predetermined end point. In this document the YPLL is calculated from the number of deaths in each age group multiplied by the years of life lost from the designated end-point set at age 61 years for males, and 65 years for females (based on the latest vital statistics of Thailand's life expectancy) to give an age-specific YPLL. Finally, the age-specific YPLL's are summed to give a total YPLL for each cause.

For more detail about the computation of YPLL, refer to the following reference from CDC, MMWR vol 35/no. 2S, 1986.

Present Method of Calculation

For routine publication of Table V, YPLL is defined as the number of years of potential life lost by each death occurring before a predetermined end point, e.g., at age 65 years. CDC calculates YPLL over the age range from birth to 65 years using age-specific death rates for 15 selected causes and supplementary data on causes of infant mortality, provided yearly by the National Center for Health Statistics (NCHS) (12). For timeliness, these data are estimated from a 10% sample of all death certificates filed during the year. Causes of death are grouped by an algorithm devised by NCHS to reflect the underlying cause of death as reported on the death certificate and the pathophysiologic process or organ system involved (i.e., malignant neoplasms or diseases of the heart).

The cause-and age-specific death rate is multiplied by the estimated population in that age range (provided by the Bureau of the Census) to determine the number and age distribution of deaths attributable to a specific cause. The number of deaths for each age is then multiplied by the years of life lost (the difference between the designated 65-year end point and the midpoint of the age range) to give an age-specific YPLL. For example, in the population 15-24 years old, the midpoint is 20 years and the YPLL is 45 years. Finally, the age-specific YPLLs are summed to give a total YPLL for each cause. The resulting distribution of YPLL, by cause, appears monthly as Table V (Table 1).

Table 1 Estimated years of potential life lost (YPLL) before age 65 and mortality, by cause of death, United States, 1984

Cause of mortality (Ninth Revision ICD)	YPLL (in thousands) for persons dying in 1984	Cause-specific mortality (rate/100,000)
ALL CAUSES (Total)	11,761	866.7
Unintentional injuries (E800-E949)	2,308	40.1
Malignant neoplasms (140-208)	1,803	191.6
Disease of the heart (390-398, 402, 404-429)	1,563	324.4
Suicide and homicide (E950-E978)	1,247	20.6
Congenital anomalies (740-759)	684	5.6
Prematurity (765-769)	470	3.0
Sudden infant death syndrome (798)	314	2.0
Cerebrovascular diseases (430-438)	266	65.6
Chronic liver diseases and cirrhosis (571)	233	11.3
Pneumonia and influenza (480-487)	163	25.0
Chronic obstructive pulmonary diseases (490-496)	123	29.8
Diabetes mellitus (250)	119	15.6

A persistent controversy in the calculation of YPLL concerns the definition of an upper end point. The CDC method of calculation does not count deaths of persons 65 years or older and assumes only 5 years of life lost for deaths of persons aged 55-64 years. In 1984, however, the remaining life expectancy for a 60-year-old person was 20.4 years. Thus, deaths in older age groups are underrepresented by the upper age limit of 65 years. However, this method preserves the emphasis on causes of mortality among younger persons.

APPENDIX A2
PRIORITY SETTING

Some of the often used procedures for priority setting of health care problems include:

I. Hanlon's Priority Setting

This method of priority setting consists of four components as follows:

Component A	=	SIZE OF PROBLEM	(0 - 10)
Component B	=	SERIOUSNESS OF PROBLEM	(0 - 20)
Component C	=	EFFECTIVENESS	(0 - 10)
Component D	=	PEARL	(0 or 1)
P	=	POLICY COMMITMENT	
E	=	ECONOMICS	
A	=	ACCEPTABILITY	
R	=	RESOURCES	
L	=	LEGALITY	

The formula appears as

$$\begin{aligned} \text{Basic Priority Rating (BPR)} &= \frac{(A + B) C}{3} \\ \text{Overall Priority Rating (OPR)} &= \frac{(A + B) C}{3} \times D \end{aligned}$$

The method is relatively difficult in scoring. The PEARL qualifying factor is given a value of 0 or 1. Since the OPR is the product of the components, then the OPR can score 0.

II. Priority Setting by Paired Comparison

This procedure of priority setting is appropriate for a small number of health problems. All health problems are compared with other health problems for their importance. The comparison is taken pair by pair. The more important problem gets a score of 1. The less important problem gets a score of 0. The total scores of all health problems is summed. The priority according to the total score of each health problem will be assessed.

III. Priority Setting by Rating Scale

This procedure of priority setting is relatively simple. Factors which determine priority of health problems are chosen. The importance of each health problem will be assessed on a rating scale given 5 for the most important, 4 for more important, 3 for moderate important, 2 for less important, and 1 for the least important. The total score all factors may be given equal or unequal weight in order to compute the total score.

IV. Priority Setting by Grouping Overall Priority (WHO)

A procedure for selecting priority health problems by grouping each factor into 3 levels as high, moderate, and low priority is set up by the World Health Organization (WHO). This procedure involves three major steps:

A. Assess importance of each health problem

Determine if the incidence, mortality, disability of each listed problem is high, moderate, or low by comparing them with the other listed problems and then assess the overall importance of each problem.

B. Assess feasibility of the control measure

The feasibility of each principal control measure for each health problem must be considered in order to plan effectively the delivery of health care. Assess technical feasibility, economic feasibility, and likelihood of good public response as high, moderate and low important for each control measure.

C. Establish priorities

Having assessed the importance of each health problem and the feasibility of each control measure, the next step is to combine these judgements into a final assessment of priority.

BIBLIOGRAPHY

- Angkasuvapala N, Banchuin K, Cheamcharas S, Wiwattanasorn T. Community Health Survey on Non-communicable Diseases and their Risk Factors in Cholburi Province: A Pilot Project. Cholburi Provincial Health Office. 1983.
- Ambrosio GB, Zamboni S, Dalpalu C. Treatment of Hypertension: the Community Approach. *Postgrad Med J* 59 (suppl 3):131-133, 1983.
- Bunnag SC, Serirat S, Pongsabutr S, Sitpreja S, Chandraprasert S, Savetrun P. Prevalence and Clinical Pattern of Diabetes Mellitus in Thailand. *J ASEAN Fed Endocr Soc* 1: 129-140, 1982.
- CDC. Premature Mortality in the United States. Public Health Issues in the Use of Years of Potential Life lost. *MMWR* 35 (Suppl no. 2S), 1986.
- Chainuvati T, Kittisupornpan S, Sripudpong S, Viranuvatti V. Incidence of Hepatitis B Surface Antigen Carriers at Siriraj Hospital. Proceedings of the Annual Conference of the Gastroenterology Association of Thailand. p. 19. 1980.
- Chamratrithirong A, Sermsri S. Draft Report on the Morbidity and Mortality Differentials ASEAN Population Programme Phase III, Thailand. 1986.
- Chiewsilp D, Scott RM, Mansuwan K, Bancroft WH. Hepatitis B Antigen and Antibody in Umbilical Cord Blood. The Annual Progress Report of the Armed Forces Research Institute of Medical Sciences. pp. 86-87, 1973-1974.
- Chitanondh H. Noncommunicable Diseases in Thailand, Background Information. Presented at the International Teaching Seminar on the Epidemiology, Planning and Designing of Integrated Programmes for Community Health in Noncommunicable Diseases. November 10-21, 1986.
- Chokkanapitak J. Survival from Carcinoma of the Cervix Uteri Stage II and III: Result of Radiation Treatment and Other Related Factors. Master of Science Thesis (in Biostatistics). 1981.
- Chunsuttiwat S, Sunakorn B. The Epidemiology of Hepatitis B in Thailand, Proceedings to the Asian Symposium on Large Scale Hepatitis B Immunization, Hong Kong, June 13-15, 1986.
- Department of Medical Sciences. Reports on the Studies of Hepatitis B Virus. Unpublished Report. 1985.
- Department of Medical Sciences, Ministry of Public Health. Statistical Report Vol 1. General and Psychiatric Hospital under the Department of Medical Sciences, 1980-1983.
- Division of Epidemiology, Office of the Permanent Secretary for Public Health, Ministry of Public Health. Annual Summary of Notifiable Diseases. 1980-1984.
- Division of Health Statistics, Office of the Permanent Secretary for Public Health, Ministry of Public Health. Public Health Statistics. 1980-1983.
- Division of Health Statistics, Office of the Permanent Secretary for Public Health, Ministry of Public Health. Morbidity Report of Health Consumer. 1980-1985.
- Division of Health Statistics, Office of the Permanent Secretary for Public Health, Ministry of Public Health. Statistical Report of Birth and Death in State-Owned Hospitals. 1980.

- Grossman RA, Benenson WH, Scott RM, Snithbhan S, Top Jr. FH, Pantuwatana S. An Epidemiologic Study of Hepatitis Virus in Bangkok, Thailand. *Am J Epidemiol* 101:144-159, 1975.
- Hansluwka H, Lopez AD, Porapakkham Y, Prasartkul P. New Developments in the Analysis of Mortality and Causes of Death. Bangkok, 1986.
- Hatano S, Shigematsu I, Strasser T. Hypertension and Stroke Control in Community. Proceedings of a WHO meeting held in Tokyo, 11-13 March 1974. World Health Organization, Geneva 1976.
- Jaisin S, Choprapawon C. The Survey of Mental Health Status in Choburi Province. *Bull Dep Med Sci* 10 (4), 1985.
- Kannel WB, Castelli WP, McNamara PM. Role of Blood Pressure in the Development of Congestive Heart Failure. The Framingham Study. *N Engl J Med* 287:781, 1972.
- King H. A Review of the Epidemiology of Diabetes Mellitus in the Asean Region. *IDF Bulletin* 28: 4-7, 1983.
- Komiya Y. Cited by Hayashi S. Economic Loss from Parasites. The second Conference of APCD Proceedings, Tokyo, Japan, pp. 102-108, 1975.
- Komkris V, Meksupa A, Ingkatanuwat P. Causes of Mental Retardation in Thai Children. Abstracts of Published Medical and Health Research 1981-1982. Department of Medical Services, Ministry of Public Health.
- Kottke TE, Tuomilehto J, Puska P, Salonen J. The Relationship of Symptoms and Blood Pressure in a Population Sample. *Int J Epidemiol* 8:335, 1979.
- Kunanake C, Sangkawibha N, Pojanageroon B. Hepatitis B Antigen in Patients and Carriers. *J Dep Med Sciences* 19 (2): 84-85, 1977.
- Mann JJ, Pyorala K, Teuscher A. Diabetes in Epidemiological Perspective. London, Churchill Livingstone, pp. 7-39, 1983.
- Ministry of Interior. Registration Report, 1985.
- National Cancer Institute, Ministry of Public Health. Cancer Statistics, 1971-1981.
- National Statistic Office. Population and Housing Census, 1980.
- National Statistics Office. The Survey of Population Change 1974-1976. Bangkok, 1980.
- Porapakkham Y. Thailand Case Studies on Sex Differences in the Utilization on Health Resource. Sex Differentials in Mortality , Trends,Determinants, and Consequences Bangkok, Thailand. 1983.
- Porapakkham Y. Mortality and Health Issues. Levels and Trends on Mortality in Thailand. Asian Population Studies Series, No. 77. Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand. United Nations, 1986.
- Prasartkul P. The Morbidity and Mortality Differentials Project. Institute for Population and Social Research, Mahidol University. ASEAN Population Programme Phase III, Thailand, 1985.

- Preuksaraj S. Studies on Prevalence and Intensity of Intestinal Helminthic Infection in the Rural Population of Thailand, 1980-1981. *Commun Dis J* 8 (3):245-269, 1982.
- Proceedings of the First National Seminar on Leprosy Control in Thailand. Ministry of Public Health, Thailand and Sasakawa Memorial Health Foundation, Japan. August 16-18, 1982.
- Punyagupta S, Olson LC, Harinasuta U, Akrawong K, Varawidhya W. The Epidemiology of Hepatitis B Antigen in a High Prevalence Area. *Am J Epidemiol* 97: 349-354, 1973.
- Punyaratabandhu P. The Study of Cervical Cancer Patients in 4 Hospitals in Bangkok. *Thai Cancer J* 2:78, 1982.
- Punyaratabandhu P, Supanvanich S, Tirapat C, Podipak A. Epidemiologic Study of Risk Factors in Cancer of the Cervix Uteri in Thai Women. *J Med Ass Thailand* 65:231, 1982.
- Ruayajin O, Tra-ngan A, Supasilp S. Social and Economic Aspects on Diarrheal Disease. Review of Literature and Concepts. Mahidol University and Ministry of Public Health. March 7-10, 1983.
- Sangkawibha N. Viral Hepatitis in Thailand. *J Dep Med Sci* 20 (1):1-12, 1978.
- Scott RM. A Comparison of Complement Fixation, Immunoelectroosmophoresis and Solid Phase Radioimmunoassay for Detection of Hepatitis B Antigen in Thai and American Populations. The Annual Progress Report of the SEATO Medical Research Laboratory. pp. 64-67, 1972-1973.
- Scott RM, Chiewsilp D, Nimmanitaya S, Bancroft WH. The Effect on the Offsprings of Maternal Hepatitis B Surface Antigenemia. The Annual Progress Report of the SEATO Medical Research Laboratory. pp. 48-51, 1974-1975.
- Scott RM, Grossman RA, Snitbhan R. The Epidemiology of Hepatitis Antigen : A Defined Urban Thai Population Antibody Acquisition. The Annual Progress Report of the SEATO Medical Research Laboratory. pp. 68-69, 1972-1973.
- Scott RM, Bancroft WH, Snitbhan R. Seroepidemiologic Survey of Hepatitis B Virus Infection in a Rural Thai Village. The Annual Progress Report of the Armed Forces Research Institute of Medical Sciences. pp. 109-114, 1977-1978.
- Scott RM, Snitbhan R, Kennedy RA, Pearlman EJ. Epidemiology of Hepatitis B in a Well-defined Rural Thai Population. The Annual Progress Report of the Armed Forces Research Institute of Medical Sciences. pp. 84-86, 1976-1977.
- Shea S, Cook EF, Kannel WB, Goldman L. Treatment of Hypertension and Its Effect on Cardiovascular Risk Factors: Data from the Framingham Heart Study. *Circulation* 71 (1):22-30, 1985.
- Snitbhan R, Bancroft WH, Scott RM. Continuing Studies of Hepatitis B Antigen Carriers in Residents of Khao Yai National Park. The Annual Progress Report of the SEATO Medical Research Laboratory. pp. 46-48, 1975-1976.
- Snitbhan R, Bancroft WH, Scott RM, Chiewsilp D. Continuing Studies of Hepatitis B Antigen Carriers in Thailand. The Annual Progress Report of the SEATO Medical Research Laboratory. pp. 44-47, 1974-1975.
- Snitbhan R, Nisalak A, Scott RM, Johnson DE. A Longitudinal Serological Study of a Lower Socioeconomic School Population. The Annual Progress Report of the Armed Forces Research Institute of Medical Sciences. pp. 96-108, 1977-1978.

- Sombooncharoen S, Sontipong S. Cancer Incidence in Thailand. National Cancer Institute Publication, Thailand. 1984.
- Somdejchaopraya Hospital. Social Welfare Workshop. Survey of the Numbers of Psychiatric Patients and the Opinion of the General Population on the Patients, Klongsan District, Bangkok, 1978.
- Srinopakun S, Chiradit C. Economic Loss from Helminthiasis. *J Nutritional Health* 12:58-69, 1978.
- Srivatanakul P, Sontipong S. Incidence of Carcinoma of Liver in Thailand in the Year 1979. *Thai Cancer J* 4:127, 1982.
- Strasser T. Pilot Programme for the Control of Hypertension. *WHO Chronicle* 10:451-455, 1972.
- Sukhonthapirom Na Pattalung P. Psychiatric Health of Bangkok Metropolitan Population. Document from the 14th Annual Meeting of the Organization of Psychiatrist of Thailand. Phumiphol-adulyadej Hospital, June 19-20, 1986.
- Thongcharoen P, Panpatana P, Wasi C. The Incidence of Hepatitis B Surface Antigen in Tropical Infections and Liver Diseases in Thailand. *J Med Ass Thailand* 59 (12):546-549, 1976.
- Tuchinda C, Wiriyakula S, Angsusingha K, Punnakanta L, Vannasaeng S. The Epidemiology of Diabetes Mellitus, Bangkok, Thailand, November 27-29, 1984.
- Unagool S. A Manual for Diabetes Patient. Fourth edition, The Diabetes Society of Thailand, 1982.
- Uraiwan K. Community Survey of Heart Diseases and Hypertension in Adult Population in Amphoe Chaiyo, Angthong Province, during April-August 1976. *J of Medical Services Department*, (in Thai) 3 (2):39-81, 1978.
- Urwijitaroon Y. Hepatitis B Surface Antigen and Antibody in the Northeastern Thais. *Bull Khonkaen Uni Health Sci* 8 (3):87-94, 1982.
- Vardthananusara C. Cervical Cancer in Siriraj Hospital. *Thai Cancer J* 3:121, 1976.
- Vardthananusara C, Wasi C, Usavajindawatn C, Thongcharoen P. Herpes Simplex Virus Type 2 and Carcinoma of Cervix Uteri. *J Med Ass Thailand* 61:14, 1978.
- Vootiprux V. Result of Treatment of Adenocarcinoma of the Cervix Uteri by Radiation Therapy. *Thai Cancer J* 3:52, 1980.
- WHO Expanded Programme on Immunization. Training Course on Planning and Management. National Priorities.
- WHO Expert Committee on Diabetes Mellitus. Technical Report Series, Number 646 pp. 10-11, 1980.
- WHO Expert Committee on Arterial Hypertension. Technical Report Series, Number 628, 1978.
- WHO Scientific Group. Primary Prevention of Essential Hypertension. Technical Report Series, Number 686, 1983.
- Wilber JA, Barrow JG. Hypertension - A Community Problem. *Am J Med* 52:653-663, 1972.
- Yongchaiyudha S. Epidemiological Study of Primary Hepatoma in Thailand. *Mahidol Uni Annual Research Abstracts*. 1978.

